METAL INDUSTRY

WITH WHICH ARE INCORPORATED

ALUMINUM WORLD & COPPER AND BRASS

BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

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A New Organization of Chromium Platers

Formation of the Chromium Platers Guild of America to Cover the Chromium Plating Industry Under the National Industrial Recovery Act. Objects are to Raise the Standards of the Industry.

THE Chromium Platers Guild of America has been organized with headquarters in New York. The objects of this association are to better conditions generally in the chromium plating industry, to eliminate unfair competition and to assure the consuming public of a high standard of labor and materials furnished. The Guild will endeavor to obtain a license or licenses, individual or collective, to permit its members to operate chromium plating plants under certain inventions covered by certain chromium plating patents, and further to grant sub-licenses under any collective licenses which the Guild may obtain. In conformance with the Industrial Recovery Act, none of the actions or purposes of the Guild will in any way promote monopolies, eliminate or oppress small enterprises or discriminate against such small enterprises.

Any job chromium plater or manufacturer engaged in the business of job chromium plating may participate in a Code of Ethics which the Guild is drawing up, whether they are members of the Guild or not.

In the code provision is made for maximum hours and minimum wages of the various classes of labor employed in chromium plating shops, and the sanitary conditions to obtain in these shops for the protection of employees. Provision is also made to eliminate doing work below reasonable cost; said cost to include all of the direct labor, direct outlay for materials, overhead, royalties, etc. It is intended also that the Guild will set up and aid its members in installing a uniform cost system and estimating system to prevent the unduly wide differences in prices which now exist.

Unfair trade practices will be prohibited. Among these unfair trade practices are specified: inducement to breach of contract between labor and employer; enticement of labor from one employer to another; espionage on methods of plating and customers to whom work is to be delivered; inducement of breach of customers' contract; misbranding; bidding for work without definite written or verbal estimates (in other words, indiscriminate price-cutting).

It is the purpose of the Guild to create a high standard of work throughout the job shops of America. For this purpose a Hall-Mark of standard quality will be set up, said Hall-Mark to be applied only to the highest quality of work, as the best that the industry can offer. Although members will have the right to do work according to customers' specifications, where the conditions demand or permit a lower grade of plating to be performed, the Hall-Mark shall be placed only on the highest grade.

The Guild contemplates a number of varied activities as soon as it is completely organized. At the present time, however, it will be the main effort of the Guild to increase its membership so that its code will be accepted by the Government as fairly representing the industry.

At the present time the management of the Guild is entrusted to an executive committee consisting of five of the members who are as follows:

R. Plumacher and Sons.
Tillmann Electroplating Works, Inc.
Philip Sievering, Inc.
National Chromium Corporation.
Brust Brothers, Inc.

The executive secretary is Walter Plumacher, 344 East 59th Street, New York.

Electroplaters are invited to get in touch with Mr. Plumacher without delay in order to facilitate the active operation of the Guild for the benefit of the industry.

Electroplating Generators

By CHARLES J. SCHWARZ
St. Louis, Mo.

A Series of Articles on the "Cornerstone of the Plating Plant"—Part 3*

THE terms series, shunt, compound, separately excited shunt, and separtely excited compound designate the types of main pole windings of direct current machinery. The addition of commutating poles or interpoles, does not modify essentially, the characteristics of these various types of windings, simply adding specific advantages.

While these terms are generally well known and understood, we shall attempt a brief definition and a short explanation of the characteristics of each of these different types of windings.

For the purpose of clearness, we shall first consider generators provided with main poles only.

Series Winding

The entire current drawn from the series generator is carried through the convolutions around the main poles. The number of convolutions is small, the cross section large, the resistance of the series field low. (Fig. 1).

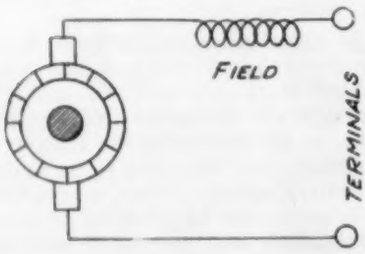

Fig. 1. Series Generator.

Until current is drawn from the series generator, the fields are evidently without excitation and the voltage generated is due to the residual magnetism

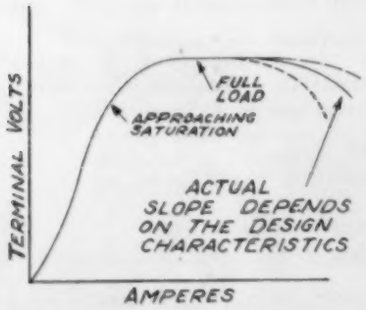

Fig. 2. Characteristic Graph of a Series Generator.

of the ferrous portion of the machine. When current is drawn it flows through the convolutions energizing the fields and the voltage rises across the terminals as the current increases, at first rapidly until saturation of the ferrous parts begins; then more slowly as saturation takes place. But a portion of the generated voltage in direct ratio to the current is consumed overcoming the resistance of the armature and series field, so that at a certain value of the current the increment of voltage from increased induction fails to balance the decrease caused by resistance and terminal voltage drops. (Fig. 2).

The fundamental features of the volt ampere curve of the series generators are:

1. An initial sharp rise, followed by
2. A gradually lower rise, culminating in
3. A maximum point, after which comes
4. A drop more or less sharp.

Such characteristics are undesirable in the plating room and series wound generators have practically disappeared. Their study is interesting and valuable to a clear understanding of the compound wound generator.

The effects of temperature in the series generator do not materially affect its volt-ampere curve, because the excitation and therefore the voltage generated are the same when the machine is hot or cold for a given ampere output. There is some drop in voltage due to the increased resistance of the armature and series fields.

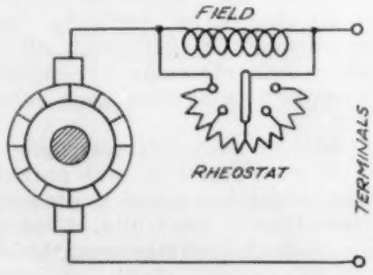

Fig. 3. Series Generator.

Fig. 3 shows an adjustable rheostat in parallel with the series winding.

Shunt Winding

The winding of the shunt generator, Fig. 4, is connected across the terminals of the armature through the brushes and, therefore, is in parallel with that winding. The full terminal voltage generated is always across the terminals of the shunt winding. It is, therefore, necessary that its resistance be sufficiently high to permit only a fraction of the total current to flow through its convolutions and, therefore, the number of these convolutions will be large.

* Parts 1 and 2 were published in our June and July issues.

the cross section small and the resistance high.

When no current is drawn from the shunt generator, the fields are excited to a maximum. The terminal voltage will be a maximum because the smallest possible current is drawn, causing a minimum voltage drop in the armature due to its internal resistance and reaction. This maximum terminal voltage forces the greatest current through the fixed resistance of the convolutions, producing the highest ampere turns and consequent induction and voltage.

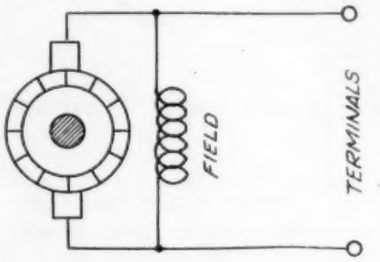

Fig. 4. Shunt Generator.

When a small current is drawn from the shunt generator, that current added to the current flowing through the shunt field increases the armature resistance losses and reaction, causing a slight drop in the terminal voltage which drop will diminish the current flowing through the convolutions, reduce the ampere turns and the consequent induction, thereby further reducing the induced voltage until a balance is reached.

For every increment in the amperes drawn from the shunt generator a new balance will be reestablished, the terminal voltage going down until the machine ceases generating.

The typical volt-ampere curve of a shunt generator shown in Fig. 5. It can be modified to suit various

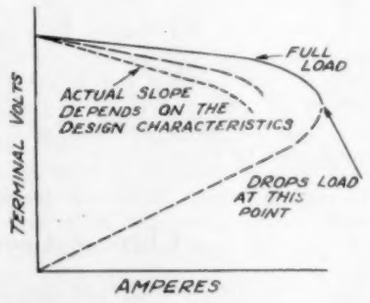

Fig. 5. Characteristic Graph of a Shunt Generator.

purposes by carrying the excitation well above saturation of the ferrous parts and providing an armature of low resistance. The voltage drop can be greatly reduced as well as the effects of temperature rise which we will now discuss.

When a shunt generator is started, the field coils are at room temperature, having a certain resistance, allowing a proportionate current to flow, and producing a definite magnetization which induces the electromotive force generated by the armature. The flow of current through the coils causes a rise in temperature, increasing the resistance, reducing the current, the magnetization and induced voltage. That effect continues, a new balance being constantly reestablished until the generator attains steady temperature.

Therefore, in addition to the voltage drop due to the increase in the amperes drawn from the machine, there is another voltage drop due to the increased temperature of the fields. To offset these effects, shunt fields are designed with a lower resistance than they would have if connected directly across the terminals. They are connected to these terminals through an adjustable field rheostat, (Fig. 6). Adjustment of that field rheostat permits maintenance of a fixed voltage within the range for which the generator is designed.

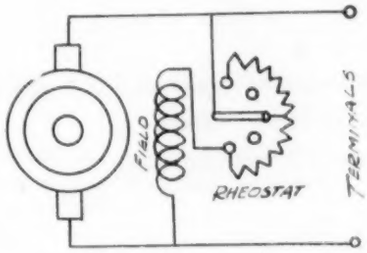

Fig. 6. Shunt Generator.

Very few shunt generators are used today in plating plants, although they have the admirable quality of never reversing their polarity under the influence

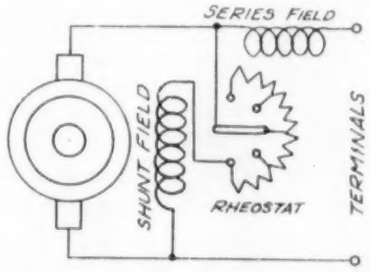

Fig. 7. Compound Generator.

of the counter electromotive force of a solution to the electrodes of which they are connected.

Compound Winding

The compound generator is a combination of the shunt and the series machine Fig. 7. The voltage of

Fig. 8. Characteristic Graph of a Flat Compound Generator.

the shunt generator drops, whereas the voltage of the series generator rises as the load in amperes increases. A suitable combination produces the constant voltage generator known as Flat Compound (Fig. 8).

An excess of series ampere turns causes the voltage

to rise with the load and the generator is Over Compounded (Fig. 9).

When the series ampere turns are not sufficient to maintain the no load voltage at full load the generator is Under Compounded (Fig. 10).

Frequently generators are overcompounded, and an adjustable shunt placed across the terminals of the series winding allows operation as Over Compounded, Flat Compounded or Under Compounded to any desirable degree.

The compound generator will reverse its polarity when its generated voltage falls below the counter electromotive force of a solution to which electrodes it is connected.

Separately Excited, Commutating Poles or Interpoles will be the next subject.

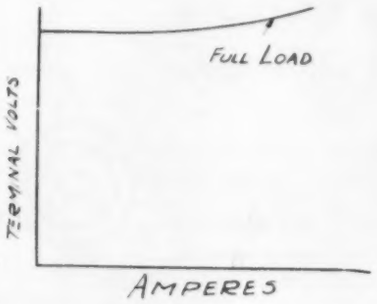

Fig. 9. Characteristic Graph of an Over Compound Generator.

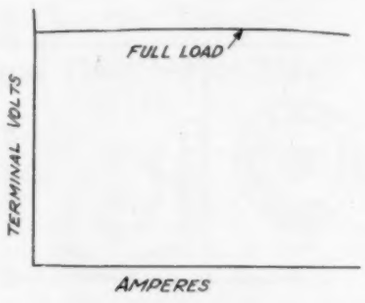

Fig. 10. Characteristic Graph of an Under Compound Generator.

"Growing" Die Castings

Q.—WE WOULD like to know if you could tell us the reason, also a remedy to prevent the growing of die castings we use in our production.

In other words, we use die cast blocks 1" long x ¾" width x ½" thick. On the 1" x ¾" side it is scooped out—and into this we use a wax which holds small parts and which has to go through different operations. After completion of these operations, we remove the small pieces from the wax on blocks and proceed to clean these blocks; which we use over and over again.

The following is the way we clean these blocks for use. First, we remove the wax by heating same on an electric hot plate, and pull out the piece of wax. Secondly, we place these blocks into a wire basket then into a boiling solution of cleaner for about 15 minutes; remove and transfer to plain boiling water for about 5 minutes; and then remove to a wooden box where we let same cool before using again. This method has proved very satisfactory.

However our trouble now starts. We find that these blocks get larger each time we use them, and as a result, we must grind all dimensions—because the machines that are made to receive these blocks are of standard +.001—.001.

We measured these blocks after using same several times and find that they are as much as .010 in length —and .008 in width and height.

What would you advise us to do, as we find it very expensive to regrind each time we have to use these blocks?

A.—Your trouble may be due to the use of an inferior alloy in the castings, that is the use of zinc, which is not up to the High Grade standard. It is true, however, that the cleaning treatment which you give the castings is very drastic and it may be worth your while to consider a change in that process. One of our experts recommends a hydrated solution of a mixture of a high-test gasoline and carbon tetrachloride or other volatile solvent and degreaser, perhaps trichlorethylene, this to be followed by a trisodium phosphate electro-cleaner.

Removal of the waxes by saponification will probably never be satisfactory owing to the extreme difficulty in converting the heavier waxes. The solvent action of the degreaser followed by the detergent action of the electro-cleaner will undoubtedly be found considerably better.—Ed.

Chrome Crystals

Q.—We are considering the use of "Chrome Crystals", so called, which are approximately 97% chromium metal, but are uncertain as to the variations in amount and kind of impurities. We believe that they are a by-product of the plating industry and would like to know under what conditions and in what wet or dry processes they are formed.

A.—It is our opinion that the pellets of chromium are those which form as "trees" on racks that have been covered with a resist. Wherever there is porosity the chromium deposits as a tree. These deposits are brushed off and saved.

It is also possible that the pellets consist of the grindings from gauges or other articles that are heavily plated and then ground to size.

We doubt very much if large quantities of metallic chromium are produced in this fashion, as they are simply the small percentage by-products of electroplating operations.—E. E.

The Unprincipled Mal-Practice of Metal Rolling

By A. L. MOLINEUX
Rolling Mill Production Manager
Birmingham, England

How "Skilled" Labor Manages to Turn Out So Much Useless Metal

THE first step in the production of rolled metal, assuming sound cast strips are available (a thing that is easier to assume than to obtain as a fact), is the breaking-down. This is done by highly skilled men called rollers.

It might be thought that the most important part of a roller's job was to roll. This, however, is not the case. The most important part of a roller's job is to make his tea. This is done by placing approximately a pint of cold water in a can, adding thereto several teaspoonsful of tea and suspending the can upon the end of a hook inside an annealing furnace the door of which has been opened by an obliging annealer.

The water having boiled the can is removed and the milk added. The roller presenting his dorsal aspect to the fire then proceeds to combine bodily comfort with a discussion upon the Athletics' chances in that day's game, at the same time rotating his can alternately in a clockwise and counter-clockwise direction to cool the tea. Should the centrifugal force so exerted exceed the tensile strength of the can handle it will be unfortunate for anyone in the immediate vicinity. The roller having refreshed himself and the foreman having finished his breakfast, the actual rolling may now begin.

Rolling generally is of three kinds, the straight, the single curve and the multiple or reverse curve. For straight rolling all that is necessary is that the adjusting screws in the roll frames should be set down evenly, but any highly skilled roller scorns such simple things, and by highly skilled manipulation of the screws can produce the single or multiple curves which are so sought after by customers. The amount of reduction to be given at each pass for each grade of metal has been carefully worked out by the management, but your skilled roller magnificently contemptuous of such arbitrary limitations upon his artistic skill, rolls on and on until either the strips split or the need of a little liquid refreshment becomes imperative.

A little airy badinage with his friend the annealer is necessary for full indulgence of this need.

Annealing

Annealing is an art which has been known since the earliest ages, when man by the application of heat was enabled to forge himself an axe wherewith he might cut short his wife's needlessly prolonged dissertation upon his marital shortcomings.

The principles of annealing have not altered, the only difference being that today manufacturers provide little clock-like articles which they firmly believe register temperatures. These are called pyrometers and they are of two kinds—the horizontal, and the vertical, or wall type. Each of these types has its advantages. The former can be used to stand a tea-can on, while the latter is most useful for hanging coats for drying.

Both types however, are remarkable for their effect upon the production manager. When these little clock arrangements register 650° C all is well; at 675° C the manager is observed to become peevish and restless, whilst at 700° C apoplexy is likely to supervene. It is therefore wiser either to keep the needle below 650° or else to cover it up when the production manager is about. The whole principle of annealing may be briefly described as "putting the metal in the fire until it gets hot and then taking it out again," and ten or fifteen minutes either way may be taken as a safe working margin.

The annealing being satisfactorily concluded, the metal will have acquired a fine black skin of oxide. The removal of this is called "pickling." This black oxide skin is obtained so that work may be provided for the picklers to get it off again.

Pickling

This is carried out in a large lead-lined wooden bosh which is reputed to contain a 10% solution of sulphuric acid and is heated by a steam coil which invariably leaks. The 10% is quite an arbitary figure. The only judge of its correct strength is the foreman of the mill who, by years of practice, can tell the actual strength by taste.

Upon the slightest provocation this individual will immerse his forefinger in the pickle carry it to his lips and with the air of a gourmet tasting caviar, pronounce judgment upon its flavor.

Under his direction laborers will then add either oil of vitriol or water until he announces himself satisfied. By the time the foreman is satisfied the steam coil will have leaked another gallon of water and the whole process can then be repeated.

The metal to be pickled is immersed in this solution until the manager happens to walk that way: then a scene of great activity will prevail. The metal will be hauled out and immersed in the water bosh. It is then ready for another rolling operation.

The regular cleaning out of pickles plays a most important part in the production of high quality cold rolled metal. Boshes must be cleaned out at least once in every five years, or whenever the copper sulphate deposit in the bottom of the bosh reduces the working depth to less than six inches.

If a few coils of brass bound with iron wire can occasionally be dropped in, the surface of the brass will acquire a beautiful reddish tinge and the production manager will acquire a similar hue trying to find out where the red stain has come from.

These various processes of rolling, annealing and pickling are carried on until the metal has reached the correct gauge. It is then ready for cleaning and either shearing or chopping to width.

Cleaning

The object of cleaning is to obtain a nice bright surface for the customer, who will show his appreciation of which he will give it with a blow lamp or in a steel-hardening furnace. Cleaning also enables the cleaner to show his skill and artistry by engraving on the surface hands can walk on it. It is then ready for its preliminary all the mill trolleys can be run over it and all the mill sole purpose of removing them.

After cleaning, the metal should be thrown on the floor, preferably in the busiest gangway available, where inspection before the final shearing operation.

The inspection department, which should always be housed in the darkest corner of the mill, without any means of artificial light, will then, after a cursory examination reject it. This will serve a two-fold purpose. It will prove that an inspection department is really necessary, and at the same time will provide more work for the men who will have the privilege of rolling the rejected metal all over again. This will create more employment and hence help to lessen taxes.

Shearing

Should the metal by any unforeseen circumstances pass its preliminary inspection it is then ready for compound shearing to its finished width. It is in this operation more than any other (except perhaps that of shipping), that an opportunity is given to the individual to display his artistic skill. One golden rule can be stated for success in this sphere of the rolled metal trade. It is "Never measure the width of any sheared metal twice." Have confidence in yourself. Set the shears and shear. Your job is to shear, not to inspect. Leave that to the inspection department. If by chance you should happen to shear two or three tons of metal 1/16" under width, do not be discouraged. It will enable the inspection department to justify its existence and provide work for the rolling mill to replace it.

The success of a shearer may be gauged by the number of parallel scratch marks he can imprint upon the metal under his care. Three scratches per inch width are considered passable but the real master of his craft has, under favorable conditions, been known to produce seven per inch width. This is of course exceptional, but it is the goal to which every young shearer should aspire. The look of sheer (shear) delight which will transfigure the face of the customer when he perceives this tribute to his aesthetic sense will amply repay you for any trouble you have taken.

Packing and Shipping

Such metal as survives the various operations of rolling, annealing, shearing, etc., is now ready for packing and shipping. It is in this department that the material may be said to receive its "coup de grâce."

The packers should be strong silent men with very large feet. It is essential that their boots should be shod with iron tips and horseshoe iron heels for it is these iron heels that enable them to pack sheets into a case several inches too short. As each sheet is placed in the case the packer and his mate take it in turn to impress their iron heel marks on two opposite corners of the sheet. This delicate emblem of good luck, when seen by oblique illumination has all the beauty of the finest repoussé and it cannot be blamed upon the packers if the customer's sensibilities are so blunted that he cannot appreciate it.

If the packers have a flair for dancing so much the better, for any soft copper sheet can be vastly improved in appearance by two two-hundred pound men dancing a few steps of the Highland fling thereon.

Should the customer, however, **not** approve of this particular pattern, he may complain bitterly to the manufacturer who, sending for his production manager, will promptly discharge him for lack of attention to detail. But as no one has ever yet discovered any real reason for the existence of a production manager he will not be missed.

Casting Gold Rings

Q.—WILL you kindly give me some information concerning the casting of gold. I am employed by a manufacturing firm, but my working time has been reduced. I have the opportunity to make some emblem rings during my own time, but the method I have been following is not as economical as it should be to make them at the proper price.

Here is what I am after: some material, other than casting sand or dental investments, that I can use to make a mould that will stand up for a hundred or more rings, casting them five or six to the pour. Is there some investment or clay that is being used for that work?

A.—For many years the jewelers' supply manufacturers, as well as the dentists and foundrymen, have been searching for the ideal casting material, and the search is still going on. Cuttle-fish bone has been used for generations; indeed, we are told that the Egyptians used it. It has many disadvantages; no two pieces are exactly the same; if the bone is taken from a live fish its texture is good; if the fish has been dead for some time the bone will contain cracks and be unsuitable for casting. Also, a piece can be used for but one pour. But even with these disadvantages cuttle-fish bone is still being used.

The Bureau of Standards at Washington has for some time been working on the chemistry and properties of various materials used in dentistry. This includes the materials used in casting. Several very interesting papers have been prepared, some of which have been printed in the Journal of the American Dental Association. We suggest that you visit your local public library, or the library of your medical or dental association, and consult the files of this Journal. The issues of December, 1930; January, 1931; February, 1932; and January, 1933 should be of interest.

However, these papers will not tell you how to make a casting material that will stand up for a hundred pours. That is a problem that has not as yet been worked out. JEWELRY METALLURGIST.

Mechanical Finishing

By WALTER S. BARROWS

Toronto Branch, American
Electroplaters' Society

Finishing Steel Products by the Use of Sand, Shavings, Soap Suds and Steel Balls. This Paper was Awarded the First Prize at the 1933 Convention of the A. E. S.

FROM THE REVIEW OF THE AMERICAN ELECTROPLATERS' SOCIETY, APRIL, 1933

MY EXPERIENCE in the field of mechanical finishing dates back to the year 1908. An English lad working on my staff suggested the installation of a small tumbler for use in brightening certain steel articles we were then obliged to finish direct from heat treatment. The machine was built, proved a success and is still rendering splendid service after twenty-four years of use and abuse. In 1910, we purchased our first ball burnishing machine, one of the octagonal type with two compartments. This machine is also in daily use at the present time. At the start we used soap chips according to advice obtained from various sources, but the results were not such as to make us contented. Soap bark, soap powders, soft soaps, bran water and many other lubricants were employed. Boric acid was tried and it did better than anything previously tested, so we adopted the idea and used boric acid as a lubricant for a long time. However, it seemed rather expensive and the yellow tinge given to nickel plated articles burnished in it was particularly objectionable. Of course we could remove the color, but this feature together with the other little troubles seemed to dampen our ardor respecting ball burnishing. Eventually we discarded boric acid and returned to the use of soap. Furthermore, we faithfully adhered to the brand of soap previously used. Other brands or forms of soap proved less effective or too expensive. We were not advised to soften the water used for burnishing and we did not know enough to do so without being told, so that explains why so much disaster entered into our initial work at ball burnishing. We were willing and worked hard, but that did not get us very far. We tried nickel solution diluted to a very pale color. It worked in a manner similar to boric acid and with some of the same objectionable results. Even at the present day when a large quantity of small nickel plated pieces is taken from stock and given the cyanide hardening treatment and then sent to the plating room for refinishing, we simply place the pieces in a mechanical plating machine operated in a nickel solution, insulate the contact arms and rotate the cylinder for a brief period to effect a new finish on the original deposit.

Troubles with Cast Iron Barrels

As years rolled by we were required to attempt substitution of tumbling for polishing in the final finishing of certain forged steel and bar steel articles. A cast iron tumbling barrel was purchased, having dimensions of 28" x 36". In this we treated 2500 pieces at each charge. The pieces were 1" wide x ¾" thick by 4" long; they were forgings with both ends somewhat rounded. Sharp builders' sand and carbonate of soda were used. Four months later the tumbler was a wreck. The makers of the tumbler gave us another, F. O. B. factory, free of charge. But that one suffered the same early demise and in less than five months it was on the scrap pile. Well, in the meantime, we had satisfied ourselves that the process was worth continuing if we could get a tumbler that would stand up longer, used in the same manner as we had used the first two. So we made a pattern and cast a tumbler of a mixture containing 4% of nickel and with walls one inch thick. Furthermore, the actual casting operation was carried out under the personal supervision of our chief pattern maker. The walls were of uniform thickness and devoid of blowholes. Thin walls and blowholes seem to be the cause of early breakdown of many good looking cast iron tumblers. We successfully repaired small leaks from blowholes by use of two washers made from fabric inserted rubber packing, two iron washers and a carriage bolt of suitable size. Leaks from checks or cracks were a little more difficult to remedy, but were quite satisfactorily stopped by use of bitumastic preparation which we mixed with a small amount of Portland cement and then the crack on the inner surface was covered with a piece of rubber packing held in place by a steel plate which was secured by bolts in the manner just mentioned.

For the purpose of making the charging door water tight we use a circle of ⅜" rubber tire such as is used on children's go-carts, etc. This we find more effective and less expensive than rubber packing.

Abrasives

The question of the efficiency and cost of builders' sand as compared with emery was met by long and carefully supervised tests, with the following results. Builders' sand cost us $3.00 per cubic yard. One

cubic yard of sand was exhausted on 10,000 forgings of the size previously mentioned, an average run being over a period of 55 hours. Broken emery wheels of varying grain were then tried, with emery purchased for 3c per lb. F.O.B. factory. 100 lbs. sufficed for roughing 10,000 forgings of the same size and type as those treated with sand. The same tumblers were used for all the work. We found that with emery we could reduce the actual period of tumbling to 45 hours and have as good if not better surface on the forgings than when operating 55 hours with sand. Later we began the use of granite chips in combination with emery. Broken granite slabs were obtained from a monumental works yard for simply hauling it away. Granite wears away slowly and when used alone effects a much smoother finish on metal surfaces than when combined with coarse emery as we then used it. The sludge from granite is comparatively fine and free from grit. Emery wheels used in our own factory were collected as fast as discarded and used as a tumbling medium in separate barrels. These wheels are of finer grain than the wheels purchased for tumbling purposes. I believe they are called rubber bonded wheels.

I have understood that some operators experience more or less annoyance from excessive gas formation within the tumbler when this type of emery wheel is used as a tumbling medium. I do not know that we have had more trouble, because we learned to be cautious before we began using emery wheels. The closest approach to a tragedy occurred during the use of a huge steel tumbler with cone shaped ends. The machine was loaded with forgings, sand and water. Through the center of the shaft at one end was a hole one-half inch in diameter. A steel rod three-eighths of an inch in diameter was kept in the hole so that at frequent periods during each day the operator could free the hole of sand and satisfy himself that the vent was open. One day he failed to attend to this little ramrod and the sand became packed around the rod in the hole, stopped the escape of gas until finally the steel rod was forced out with the speed of a bullet from a rifle. The rod shot straight as an arrow for a distance of fifty-eight feet, missing, only by three inches, the body of a workman.

It requires only one experience such as that to make a foreman cautious, but, future freedom from accidents may depend largely upon the attitude of an operator toward the warnings given him. For instance, a bright young fellow whom I had carefully trained for weeks, became so enthusiastic over the results of a noon time ball game, that he omitted to release the vents of a large roughing barrel. When the closing hour release was made the pressure within the barrel was terrific. One turn of the wrench used to loosen the cover was sufficient to allow a small stream of greasy, black muck to be blown from the barrel to a distance of thirty feet, where it struck a female employee and utterly ruined a pretty white blouse, caused the girl to suffer shock and the seclusion of the rest room for the remainder of the day. You may operate tumbling machines on an extensive scale for many years and not experience similar conditions, but I mention them here as a reminder to all that something unpleasant can happen if vents are not given careful, regular attention.

Finishing Bar Stock

By using an oscillating barrel we obtain a given finish in about one-half to three-fourths the time required to do the same job in a horizontal barrel. Round bar steel stock three-eighths inch diameter and five-eighths inch diameter, is finished in wooden tumblers twenty-eight inches in diameter and sixty inches long. Each tumbler is divided into two compartments. The ends of each section are protected by a plate of one-quarter inch boiler iron. The articles treated in these tumblers are of irregular shape and one hundred pieces constitute a load per section. Each compartment is then charged with approximately one-half bushel of circular sheet steel punchings which have previously been tumbled sufficiently to smooth the edges. The punchings are about one inch diameter by one-eighth inch thick. Finally, the compartments are packed tightly with dry shavings. These shavings are such as are produced by a planer or a hogging machine, they are not as fine as sawdust and act effectively as a polishing medium, being carried with some force by steel slugs. Three hour treatments usually suffice for the five-eighths stock, but the three-eighths stock is in an inferior raw condition due to inclusions produced during hot rolling.

Representatives of steel mills tell me that it is practically impossible to produce as good finish on raw three-eighths bar stock as on stock of greater diameter. In any event, we have to tumble the three-eighths bar fully five hours to obtain an even moderately satisfactory finish.

Comparative Costs

Just a word now respecting cost of wet tumbling as compared with grinding. One forging cost $7.00 per hundred to grind and rough polish. To wet tumble in sand or emery, and ball burnish cost 63 cents per hundred. Another forging, much smaller than the one just referred to, and in the form of a shoe for use in children's wagons, bicycles, etc. as a braking shoe, cost $2.00 per hundred to polish. To rough by wet tumbling and finish by ball burnishing before and after nickel plating, cost just 20 cents per hundred. I wish it understood that I do not claim that the finish obtained by wet tumbling and ball burnishing is as perfect as may be produced by two wheel polishing, but, for many parts of products manufactured for service, the tumbling process facilitates inexpensive finishing to a degree adequate to meet present day requirements. Articles received in the tumbling section direct from carbonizing treatment are placed in a wooden, octagon shaped tumbler completely lined with quarter-inch boiler plate, and tumbled two hours without any abrasive or other tumbling medium being added. This treatment removes about 90% of the scale and produces a surface condition on the steel which is easily improved by action of shavings. The black dust or pulverized scale may be sifted out of the barrel before adding shavings, this precaution however, is not always necessary. Shavings are packed into the barrel and the treatment continued for another two hours. Usually a total of four hours is ample time for plain flat stock. Additions of sand, emery or other harsh abrasive is not advisable if a smooth bright finish is required.

Water Conditions

The water I am using is river water, the bed of the river being of lime stone, at least for some distance inland from Lake Ontario. Analysis of the water as shown by report of Government analyst is as follows:

	PARTS PER MILLION
Sodium Chloride	22.4
Sodium Sulphate	5.5
Calcium Sulphate	39.0
Calcium Carbonate	103.4
Magnesium Carbonate	43.3
Silica	11.4
Ferrous Carbonate	8.2
Organic Matter	10.6
Total Solids	243.8

Soaps

We do not place soap chips in the barrel and then add hot water. Instead, we make up forty-two gallons of soap solution in an iron drum. To make this solution we use eight ounces of a compound of trisodium phosphate, sixty per cent, and soda ash, forty per cent. Steam is injected into the water and when temperature has attained approximately 120° F., the compound is added and allowed time to become thoroughly infused. Then twenty-one ounces of kiln dried soap chips are slowly poured into the swirling liquid and the injection of steam is stopped when temperature of the solution reaches approximately 170° F. This is our stock soap solution. It is impossible to drain an octagon barrel without using a strainer to retain the balls. Therefore, after washing the balls there remains about two or three gallons of water which naturally dilutes the stock solution subsequently added. Three gallons of stock solution per compartment is used. Now, it will be seen that the volume of solution within the compartment is actually four or five gallons rather than three gallons added from the stock solution. You will also note that instead of a stock solution containing one-half ounce of soap per gallon, we actually burnish in a lubricant composed of only one-quarter ounce to three-tenths ounce of kiln dried soap chips dissolved in softened water.

21 oz. soap chips @ 11c per lb. = approx.	14.5c
8 oz. water softening compound @ 6c per lb	3.0c
Total for 42 gallons	17.5c

In each compartment we burnish from fifty to five hundred pieces per batch, depending on size and shape of the article.

Now, if five ounces of soap chips per gallon of water were used and the same amount of softener used as now, the figures would be:

210 oz. soap chips @ 11c per lb. = approx.	$1.44
8 oz. water softening compound @ 6c per lb.	.03
Total for 42 gallons	$1.47

An excess cost of $1.29 or over 9c per batch.

I might say here that soap free from fillers, or pure soap, should be dissolved in soft water at temperatures between 160° F. and 180° F. Soap containing fillers such as silica, etc. begin to curd at about 110° F., therefore should not be dissolved in hot water.

We adopted one-half ounce of soap per gallon of water as standard only after long and careful tests of various kinds of soaps, burnishing compounds, powders, etc. The tests were comparative, e.g. we began with say three ounces of soap per gallon and gradually reduced the quantity until satisfied with the results, that the soap was not as good as a previous sample, or excelled it. We found the glass jar method heretofore mentioned, a great aid in determining the stability of soap suds, which we regard as an important point to consider when choosing a soap for burnishing lubricant. There may be soaps manufactured expressly for ball burnishing purposes, but I am loath to believe that the average so-called burnishing soap is other than a good quality, neutral laundry soap chip.

Available literature descriptive of soaps will prove intensely interesting to anyone responsible for use of soap in industrial processes. The amount of soap necessary to use per gallon of water depends not only upon the quality of the soap, but also upon the quality of the water and whether a water softener is employed. My early failures to use soap successfully a a burnishing lubricant were due to lack of consideration regarding the nature of the water I was obliged to use. It we attempted to burnish steel or plated surfaces in water just as it came from the tap plus soap, we produced absolutely no luster on the work, suds if any, disappeared quickly after burnishing barrel was opened, surfaces of all work were gummy and the whole outfit badly mussed up. An excessive amount of soap was necessary to produce only a light luster. Hardness of water is due to calcium or magnesium bicarbonates (that is, insoluble calcium or magnesium carbonate is chemically combined with carbonic acid to form soluble bicarbonate) or to the presence of calcium or magnesium chlorides or sulphates. All of these compounds unite very readily with soap to form an insoluble sticky "curd", so that some of the soap is destroyed in this way before it has a chance to make a suds; the amount destroyed, of coarse, depending on the amount of hardness present. Boiling water decomposes the calcium bicarbonate into calcium carbonate with liberation of carbon dioxide, and the insoluble calcium carbonate will not react with the soap, so that the water has been thereby softened.

The calcium or magnesium sulphates and chlorides, however, require the use of sodium carbonate or other alkali to react with them to produce calcium or magnesium carbonates and sodium sulphate or sodium chloride, none of which react with soap; so that the use of sodium carbonate or similar material to soften hard water containing sulphates or chlorides is essential if soap is to be saved.

Steel Balls

Now, with a satisfactory soap and a little knowledge of the peculiar qualities of the water to be employed, we need a plentiful supply of good hard steel balls. And it is advisable to exercise a little care when purchasing balls. I have used steel burnishing balls which split like peas, others that were too soft to retain their shape during six months service. Buy from a reputable dealer and specify best grade burnishing balls. After you get the balls, take proper care of them if you expect to get good burnishing. Do not use harsh lubricants. They will eventually ruin the best steel ball made. Do not allow them to remain exposed to the air longer than actually necessary. Keep them covered with softened water when not in use, whether they are in or out of the burnishing barrel. If the balls are removed from the burnishing barrel for a period of time, place them in a watertight receptacle and cover them with soda solution to prevent rusting. Rusty steel balls never clean up so that they are as good as new; often they are pitted and pitted burnishing balls are not conducive to good results on any metal surface. Keep the balls lustrously clean while in use; dull colored or gummy balls will

not produce first class effect on even the most favorable type of product.

Barrel Linings

Although I am using the octagon shaped barrel, I am convinced that the horizontal burnishing barrel is the correct thing for burnishing a large percentage of the products which are susceptible to ball burnishing. The cost of relining a two compartment 8" x 24" octagon shaped barrel with 1½" hard maple is about $38.00 and the lining will last about two or three years, depending on the amount of work burnished in the barrel and the care exercised in its use. It does not pay to have a barrel lined with second grade quality of maple, one soft spot in the lining spells trouble long before a good hard lining would begin to show wear. Some articles which lend themselves to finishing by the ball burnishing method are extremely damaging to barrel linings during burnishing operation. For instance, rat-trap pedal frames will ruin the wooden lining of a barrel so quickly that the repair man is likely to wonder if he used pine instead of maple the last time he lined the barrel. If the lining of an octagon barrel wears through to the iron shell at the circumference of the barrel and remains in comparatively good condition at the sides, the effect on quality of finish produced on metal surfaces mixed with the balls, is often inappreciable, but, if the side lining becomes defective in like manner, either by reason of natural wear or inferior quality of a section of the wood, it is unwise to delay having the machine relined.

Soap solutions should not be used extremely hot; 165° F. is hot enough to dissolve a good burnishing soap and it is good practice to manage preparation of a stock solution so that the lubricant can be employed at lower temperatures and thus effect less rapid disintegration of the wooden lining. Labor saving devices can be employed to effect quick refilling of the burnishing machine, but the efficiency of such devices depends largely upon the amount of mechanical ingenuity possessed by those responsible for their construction.

I do not believe we are now doing as good ball burnishing as may be done at some future date. I am particularly hopeful with respect to ball burnishing nickel plated articles. Small additions of sodium cyanide to a good soap solution will often aid in production of a satisfactory finish on nickel plate, and I expect that someone will blunder on to a method of producing really brilliant surfaces by addition of an equally small quantity of chemical.

Miscellaneous Considerations

One feature of ball burnishing I have omitted and which is important, is the fact, at least as far as my experience goes, that nickel plated rough raw soft steel will sometimes finish to better luster by ball burnishing than will nickel plated hardened steel which has been moderately well polished. And another point; do not blame the condition of the steel, the process of ball burnishing, the soap or the machine, if you fail to get beautifully finished surfaces during your initial attempts. It is possible that the trouble is due to some condition of the nickel plate. This is particularly true of deposits of one thousandth inch thickness and over. We produce nickel deposits over a substantial copper strike. Articles which are to be ball burnished subsequent to plating are given a little less nickel than would be the case if buffing was to be the final finishing operation.

As a general rule we get better results on nickel plated deposits obtained in the conveyor equipped bath than on nickel deposits obtained in still baths. The reason for this is that the deposits from the still baths are more likely to be coarse grained due to the operator having forced the deposition of nickel beyond the safe limits of the bath. The grain structure of the deposit does not lend itself to easy finishing by either buffing or burnishing. On the whole, a nickel deposit irrespective of thickness, which will buff readily to good lustre, will finish satisfactorily by ball burnishing. Ball burnishing nickel deposits is a very good test of the adherent qualities of the coating. There isn't much wrong with the adherency of .001 inch nickel deposits which will remain "put" during one hour milling among 300 lbs. of steel balls. Does a ball burnished nickel surface tarnish more readily than a buffed nickel surface? My answer is—no. I have tested nickel coatings upon a variety of metal surfaces, which were finished by both methods and the results were so identical after any given time that it was impossible to determine the buffed plate from the ball burnished plate. Articles that are cup shaped or saucer shaped may prove more or less troublesome when the ball burnishing process is tried on them, but usually, the trouble can be overcome by use of some type of divider, as we call it, which will separate the pieces so that they may be uniformly acted upon by the balls. One device which we use for this purpose is simply two pieces of five-eighths inch diameter round steel bar threaded on one end, the opposite end being capped with a square piece of flat steel, the corners of which have been turned outward at right angles to the flat surface. These form prongs which are forced into the wooden lining of the barrel by a turn buckle which is fitted on the threaded ends. On each side of the turn buckle and at uniform distances along the steel bar, are small cross arms which are capped with one-inch steel balls or short lengths of steel tubing which have been filled with babbit. While this device works very satisfactorily in one case, we have been unsuccessful in attempts to use it for separating an article of practically the same shape as the article successfully handled, but having just a slight bulge in it so that when two pieces are placed one within the other, it requires considerable force to get them apart. These articles are made of thin sheet steel.

I have not dealt with the use of racks within the tumbling or burnishing machine, as such practice is an exception rather than the general rule. We have, however, successfully burnished articles 3" x 3" x 16" by use of wire cages in which each article was enclosed and the cages then packed immovably within the barrel and the burnishing action made practically continuous during rotation periods by filling the octagon shaped chamber having shelves or fins built into the lining, two-thirds full of steel balls, so that there was a stream of balls passing over the work during the time that a shelf or fin was in top position with respect to rotation of the chamber. The idea was taken from a laundry machine I once observed in action. It worked, but loading and unloading were necessarily slow operations.

Finishing steel surfaces by use of sand, shavings, soap suds and steel balls furnishes plenty of interesting problems and opportunities for study and experimentation if we are inclined toward making the next batch of work look better than the last. If your product or portion of it is such as to permit of this class of finish and you refuse to adopt it, you are missing a big bundle of real fun.

The Silvering of Automobile Headlamp Bulbs

By GEORGE S. SANTMYERS
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The Author Recommends the Use of an Excess of Ammonium Hydroxide, No Filtration, for the Production of a Very Opaque Deposit from a Dilute Solution

THE present demand for the new type partially silvered automobile headlamp bulbs has, to a certain extent, stimulated research in the chemical deposition of silver on glass. The conditions which have heretofore existed in the usual routine of mirror making or for the formation of telescope reflectors do not obtain in the silvering of automobile bulbs.

In commercial establishments, individual variations of the Rochelle salt and the Brashear formula appear to be prevalent. In general, a plate of glass is laid upon a drain board and scrubbed, either dry or wet with a fine grade of pumice or other abrasive which is then washed off and followed by a treatment with stannous chloride solution. As a rule a teaspoonful of stannous chloride crystals is placed in a gallon bottle which is then filled with hydrant water, the resulting solution being poured over the glass, being subsequently washed off with hydrant water and finally with distilled water. The glass is then transferred to a large warm table and the silvering solution after being mixed is poured upon the glass to a depth of about two millimeters. Surface tension prevents the solution from overflowing from the glass onto the table. In the course of about one-half hour the mirror is complete. The table consists of a level support upon which is laid several layers of woolen blanketing material, the function of which is to absorb the spent silvering solution, to aid in the distribution of the weight of the glass and to facilitate the glass being uniformly heated. Underneath the table provision is made for heating it to a certain optimum temperature which is determined by experience. The operation of the Brashear method differs from the above in that the glass to be plated does not need to be appreciably warmed as it generally plates quite well at ordinary room temperatures within rather wide limits.

In the processing of the automobile bulbs it was found necessary to immerse them to the depth required on the silvered part of the bulb plus a clearance of about three millimeters at the bottom of the tray. In order to accommodate a rack of bulbs in a solution of such depth, economy of solution became a vital factor. It was decided that for the process to be commercially successful, a final plating solution containing not over one percent of silver nitrate could be used.

A number of mirror makers preferred the Rochelle salt method because it would produce in approximately a one-half per cent solution of silver nitrate a sufficiently heavy deposit to satisfy the trade when backed with a slate colored or black paint and varnish. This deposit without backing, was found to be quite transluscent by transmitted light, making such a mirror altogether unsatisfactory for electric bulbs. A further objection was that heat was necessary to cause the solution to plate. When a rack containing one hundred gas filled bulbs was placed in a warm silvering bath over the low flame of a hot plate, approximately eight bulbs cracked at each immersion during the plating process. The loss entailed in cracked bulbs and the unsatisfactory transluscent deposit produced led to a decision that for this purpose the Rochelle salt formula and its modifications were decidedly unfitted and so were discarded.

The formaldehyde process and its variations were then tried but soon discarded as it was impossible to produce a deposit that would adhere to the glass especially at the high operating temperature of the bulbs. When the bulbs were lighted up the silver would flake and drop off.

The remaining possibility appeared to be the so-called Brashear formula. It was noted that this process employed a final working solution containing approximately four per cent silver nitrate, at which concentration the cost of production was prohibitory. Brashear's formula is well adapted for high grade mirrors, astronomical reflectors and other work where a quality product is desired and where cost is not the primary factor. Experiments in which a full strength Brashear solution was used at room temperature on bulbs produced a quite heavy deposit but one which was literally full of pin holes. Low power microscopic observation showed many minute gas bubbles just below the surface of the glass, and for the most part it was over these bubbles that the solution appeared to be unable to plate the silver in spite of every treatment given to the glass. HCl,HNO_3,H_2F_2,$NaOH$,Na_2CO_3, Na_3PO_4,-$NaHSO_4$, various alkaline substances and many proprietary scouring mixtures all failed to eliminate the difficulty. Brashear's silver solution was then diluted to such a volume that, when it was combined with the reducing solution, a final tray plating solution resulted containing one per cent Silver Nitrate. We were quite surprised to find that the pin holes in the silver mirror failed to develop at this concentration, but that the deposit of silver was even more transluscent than that produced by the Rochelle salt method.

Several months' research resulted in the addition to the Brashear reducing solution of a few small crystals of potassium iodide per liter, which in the course of a few hours caused the reducing solution to assume a slight orange tint, presumably due to the liberation of the Iodine. This addition caused the one per cent Brashear solution to plate so heavy that the deposit was absolutely opaque, however with this heavy deposit the pin holes again appeared. On the assumption that it might be the iodine acting as a catalytic agent, a few drops of a five per cent solution of iodine in alcohol were substituted for the crystals of potassium iodide with equally gratifying results. The elimination of the pin holes was solved by scrubbing the bulbs as described below under "Preparation of Lamps."

Preparation of Lamps

The lamp rack was placed on the drain board, bottom side up and filled with lamps. A new stiff scrubbing brush was dipped into the cleaning solution, sprinkled with powdered ammonium bicarbonate and the lamps then thoroughly scrubbed. A new brush appeared to be necessary for about every five batches, as due to the softening action of the cleanser the brush became so soft and flexible that pin-holes otherwise developed.

Although pumice may be used on ordinary glass plates the use of this or of any other abrasive should not be applied to bulbs, due to the resulting mirror showing every scratch, however slight, thereby producing a rather unsightly mirror having no sale value. The rack was then stood on end and by means of a hose connected to the faucet, was thoroughly washed with warm water, after which the excess water was shaken off and the rack placed over a tray containing (1+2) nitric acid for five minutes. The acid was of such depth that when the lamps were placed over it the acid came up over the glass to a greater depth than the silver mirror to be made. (It must not be neglected to take into consideration that many of the glazes on enamel ware such as that which is found on ordinary trays contain tin oxides, in which trays nitric acid should not be placed, because nitrates of tin may be formed resulting in the ruining of the acid bath for the purpose for which it is used). The rack was then removed from the acid tray, the acid thoroughly washed off and again scrubbed as above, placed over the acid tray and again thoroughly washed with warm water. It appeared from the results obtained in this laboratory that this duplicate treatment was quite necessary. The rack still on end was then bathed with the stannous chloride solution by means of the siphon and immediately washed off with the warm water spray. This washing was repeated about four or five times in order to remove the last traces of stannous chloride. Much better results were obtained by bathing the lamps with the stannous chloride using the siphon rather than by dipping them into a tray containing the stannous chloride, in which a skin quickly formed on the surface of the solution. The bulbs, in being lowered down below the surface of such a solution appeared to receive a minute film which resulted in very poor mirrors being produced.

A final washing with distilled water from a siphon insured the removal of the last traces of the chlorides present in the hydrant water. The rack was then ready for the plating operation which follows under "Tray Plating Solution."

Solutions

Too much stress cannot be laid on the caution that rubber mounted goggles should at all times be worn by those inexperienced in the preparation of alkaline silver nitrate solutions. Those solutions containing either sodium or potassium hydroxides are especially dangerous. It is prudent to consider that any solution of alkaline silver nitrate which shows a slight mirror on the bottle in which it is kept, or in which dark sediment is noted, regardless of how little, is a potential danger and that judgment should be exercised in its handling. Such solutions may be very carefully decanted behind a reinforced glass plate taking care that the sediment is not touched with the end of the siphon. Two explosions in this laboratory due to lack of attention to the above procedure would most certainly have resulted in the loss or serious injury to both eyes had not rubber mounted goggles been worn at both times.

Potassium hydroxide.

Dissolve 200 grams C.P. pellets in distilled water and dilute to 2000 cc.

Iodine solution.

Dissolve five grams iodine in pure 95 per cent alcohol and dilute to 100 cc.

Double cyanide of mercury and potassium.

Potassium cyanide,.....0.5 gram.
Mercuric cyanide, ...0.5 gram.
Dissolve in distilled water and dilute to 100 cc.

Nitric acid for tray.

Concentrated nitric acid, Sp. Gr. 1.42....1 volume.
Distilled water .....2 volumes.

Stannous chloride.

Into a clean five pint bottle arranged with siphon and pinchcock place five grams C. P. Crystallized Stannous Chloride and almost fill the bottle with distilled water. Shake several times during the first five minutes after adding the water, until no crystals remain on the bottom of the bottle.

Glass cleaning solution.

Dissolve 100 grams cleaner in distilled water and dilute to 1500 cc. Pour out into a tray or other shallow vessel as needed. This cleaner is a mixture of detergent alkaline salts and may be obtained from electroplating supply houses. The price is very low.

Ammonium Bicarbonate.

Use the fine white crystals or powder.

Lacquer.

A dilute colorless lacquer solution is made up from a heat resisting resin. The solvent is preferably toluol, acetone, denatured alcohol, or a mixture of all three. Their prices are reasonable and they have a desirable rate of evaporation in the drying oven.

Stock Silver Solution

Into a five pint glass stoppered bottle place 150 cc. concentrated C.P. ammonium hydroxide, Sp. Gr. 0.90. Weigh out 90 grams C.P. crystallized silver nitrate and add to the ammonium hydroxide in the bottle. This procedure is important, and the use of goggles is again suggested at this point. It is advisable to add the nitrate in amounts of about thirty grams, shaking vigorously with a circular motion immediately after each addition until a clear solution results before making further additions. When all the silver nitrate is completely dissolved, the solution will be found to be quite warm or even hot. About 200 cc. distilled water are then added followed by 450 cc. potassium hydroxide solution. The entire solution is then diluted to 1800 cc. with distilled water. A scratch previously made on the bottle at the 1800 cc. mark will facilitate the dilution. Place the stopper in the bottle and shake thoroughly, after which the solution is ready for use. It will be noted that this silver solution is crystal clear, in distinction to silvering solutions in general, due to the excess ammonium hydroxide present, and it will not be necessary to filter it. When made according to this method this solution has been kept for periods as long as five days without any apparent deleterious effects on its silvering capacity. It does, however, deposit a very slight mirror on the sides of the bottle during this time. All bottles or containers in which solutions are stored or into which they come into contact must have no trace of grease, oil or paraffin present.

Stock Reducing Solution

Into a large glass or porcelain vessel place 20 cc. concentrated nitric acid, Sp. Gr. 1.42 and 5,000 cc. distilled water. Add 450 grams sucrose and stir with a glass rod until dissolved. Heat to boiling and allow to boil for five minutes. Cool, stir in 15 cc iodine solution and place in five pint glass stoppered bottles. This formula with the exception of the iodine is that commonly known as Brashear's reducing solution. In place of the iodine solution it has been found that 15 cc. of a one per cent solution of the double cyanide of mercury and potassium may be used with equally successful results. In so doing, however, it will be noted that the deposit in the bottom of the plating tray is quite different than that produced when the iodine is used and that each is different from that produced from the unmodified Brashear formula.

Tray Plating Solution

Into a 1000 cc. graduate place 330 cc. stock silver solution. Dilute to 1000 cc. with distilled water and pour into a wide mouth one gallon glass bottle or jug. Measure out another 1000 cc. distilled water in the graduate and add to the solution in the gallon jug making a total volume of 2000 cc. This procedure will insure not only getting practically all of the silver into the jug but will prevent the gradual deposition of dark silver deposits on the inside of the graduate. Place this jug next to the plating tray. Fill a 100 cc graduate to 80 cc with the stock reducing solution and likewise place this graduate next to the tray beside the jug. When the lamp rack is ready for plating add the 80 cc. reducing solution to the 2000 cc. silver solution in the jug, shake the mixture with a circular motion for a moment to insure thorough mixing and pour out into the tray. At once, place the lamp rack over the solution very carefully so as to avoid ripple marks at the border of the mirror, and leave for fifteen minutes. When iodine or the double cyanide is used, the solution when first mixed preparatory to placing in the plating tray does not turn black almost instantly as in the unmodified Brashear solution, but remains clear for about ten to fifteen seconds, at which time it turns to an orange, purple and finally black color. Experience has shown that if the tray to be used for silvering, if first given an initial coating of silver by running a bath without bulbs, will produce more satisfactory results in subsequent silvering.

Recovery of Silver Residues

When the rack is removed from the bath at the end of this period the bottom of the tray will be found to be covered with a dark spongy deposit which is washed out into a large porcelain lined container or tub. A quantity of common salt is added to the tub at the beginning of each day's work to insure the precipitation of all silver. On the following morning all silver values will be found in the bottom of the tub. The clear supernatent liquor is decanted off and discarded, and the residue washed into a five gallon bottle into which mossy zinc has been placed, for the reduction of the residues to metallic silver, which are then refined, converted to the nitrate and used over again.

Lacquering the Bulbs

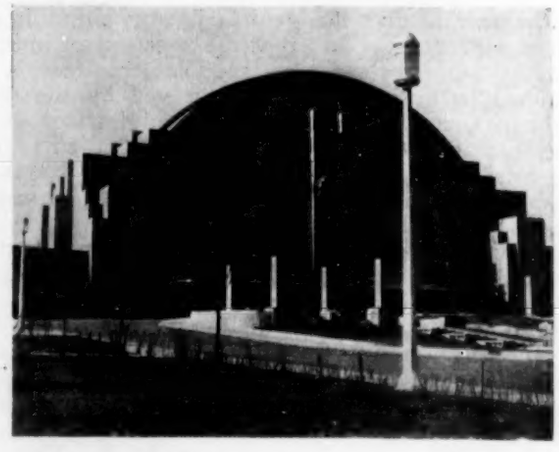
The rack of bulbs immediately after removal from the plating bath is washed off with warm hydrant water several times and followed by a final treatment with distilled water. As much water as possible is shaken from the rack which is then placed in a drying oven. The oven is heated by means of electric hot plates which are on continuously. After a fifteen minute period in the oven the rack is removed, allowed to cool and then dipped into the lacquering tray. The lacquer in this tray is of such depth that it comes up about one millimeter above the edge of the mirror when the bulbs are immersed. A cover is kept over the lacquer tray at all times when not in use to prevent the evaporation of solvent into the laboratory. After dipping in the lacquer the rack is carefully shaken to eliminate the excess lacquer and is then placed in the lacquer drying oven which is identical in construction to the first mentioned oven. On removal from this oven after a twenty minute period, the lamps are allowed to cool, removed from the rack, and each individual lamp tested for imperfections in the mirror by lighting up the filament on six volts. Imperfections in the mirror which are indistinguishable at three to four volts are quite apparent at six volts.

Conclusion

It is believed that the use of an excess of the ammonium hydroxide in the preparation of the silver solution, the elimination of the necessity for its filtration and the production of a very opaque deposit in a dilute solution of silver by the presumably catalytic action of iodine or of the double cyanide of mercury and potassium, represents a method of silvering glass in general which may be of interest to those in the industry.

Aluminum Lamps Light Terminal

The design of the lighting standards and luminaires installed on the Plaza of the new Cincinnati Terminal Passenger Station is in harmony with the motif of the passenger station itself. This design consists of two distinct heights of Westinghouse hollowspun granite standards, of a special concrete mix and two sizes of special aluminum luminaires.



Plaza of New Union Terminal at Cincinnati, Showing Lighting Fixtures with Aluminum Luminaires.

Circuit breaking apparatus in the bases is protected by aluminum cover plates.

The luminaires are constructed of cast aluminum, and the side panels are of a new type of high transmission glassware. Gaskets have been provided to make the luminaires dust and bug proof.

EDITORIALS

How Is Business?

GENERAL business continues to improve. The business index continues to rise, although lately it has been mounting at a slower rate than previously. Prices are also strong.

All around us we hear the question, "How long will it last?" "Is it permanent?" Nobody can answer because first of all, nobody can say exactly to what the price rise and the increase of business is due. Nobody knows whether it has been caused by the fear of inflation alone, or by such extreme depletion of inventories that the time has arrived when buying must be started, or whether the slight increase in employment has already taken effect and the public is beginning to buy, or whether the rise in the stock market (undoubtedly due to the fear of inflation) has provided the upper middle class, the stock-owning and speculating public, with sufficient funds for them to be able to spend more freely. So at this writing we have nothing but hopes—and fears. In spite of the fact that in our own trades, metals and metal finishing, business is undoubtedly greatly improved over what it was several months ago, operating schedules have been increased, prices have risen, current payrolls have risen in number and in many cases also in wage rates paid, it is far too early to say that the depression is definitely over.

The fear is that the gain is illusory; that it is a paper improvement and that the prospect of inflation is responsible for most of it. That this fear is not confined to prejudice alone is proved by the statement of General Johnson, chief administrator of the National Industrial Recovery Act, to the effect that the raising of prices and the volume of production have unquestionably far outstretched consuming power. The things produced have exceeded the capacity of the country to consume them in a country with 12,000,000 people out of work. He specifically warned the public that there may be a second collapse if there is excess production relative to purchasing power. Hence the drive on the part of the Administration to bring in the trade codes as fast as possible, and latterly the blanket code to which all employers are asked to subscribe voluntarily.

All of these moves are commendable. They are far-sighted, seeing the dangers ahead as well as the present improvement. They seem to be economically sound in demanding purchasing power to consume the goods produced, to avoid the catastrophe of overstocked inventories which will only lead to another recession. But, although it is a simple matter to ask employers to raise wages, it is a different matter to add to one's expenses before seeing returns. It is the employer who must gamble with his already depleted funds. This is perhaps economically as well as morally right, but it is none the less dangerous.

That the business interests of the country are rallying loyally to the fight is proved by the numerous reports in the daily press of wage increases, ranging from 5 to 15 per cent. To be sure wages in many instances are still cruelly low. Nevertheless it can be said that business is by and large doing its share.

We are in one of the most critical periods of the depression. We may very well be on the way out. The public may be buying more than it did at the low point. If the automobile figures are at all indicative, this is true. It is also true, however, that we have a long way to go, that we cannot relax, that business as a whole is not yet profitable, that wages are still low and that unemployment is still widespread.

A victory in this fight will be gained only by the united efforts of business and labor, each being satisfied with half a loaf. Partisan selfishness, whether it be political or economic, cannot be allowed to exist. Undue advantage, gained at the expense of others, may precipitate a struggle that will bring down the whole of our still weak structure of improvement, and it is a grave question whether the country can stand another break.

So as we said before, we have our hopes and fears. The next six months may tell which will come out on top.

Back Up Your Trade Association

AS we have pointed out many times before in these columns, the metal industries are peculiar. Although the sum total of their output runs well over a billion dollars per year, they are made up of a number of diversified, heterogeneous, and in many cases seemingly unrelated trades. Under the circumstances, therefore, they have been at something of a disadvantage in standardizing their trade practices and preparing codes for the approval of the Administration. There is no one trade association which could cover them all. Their problems are too different. For that reason the last two months have witnessed the growth of a variety of groups to protect their individual interests, among which are the non-ferrous foundrymen, the non-ferrous metal fabricators, the electroplaters and the lacquer manufacturers.

Some of these groups would seem on the surface, to be able to find a home elsewhere, under a large tent, but such apparances are deceptive. The lacquer manufacturers for example, have in the past belonged to the National Paint and Varnish Manufacturers' Association. But they have found time and again that their interests are competitive with paint and varnish.

Consequently, they have no other course but to band together for their own protection. To be sure they may co-operate with the larger organization. Their trade practices may be similar. But their problems require concentration, and the close attention which only they themselves can give. Ingot metal manufacturers are a part of the waste material trades, but they have within themselves such divisions as copper base ingots, aluminum ingots, etc. All of these specialties need individual attention and should get it.

The jobbing electroplaters are clearly a unit. Even though throughout the country much more plating is done in departments of manufacturing plants, the job platers have problems like no other trade. The jewelers and silversmiths are beset with evils, such as style piracy, in addition to the other ills of industry. The non-ferrous metal fabricators, (rolling mills) a tremendous industry with a comparatively small number of units, must take care of their own house, as the copper producers who own a large proportion of their output cannot adequately care for them.

The wide diversity of associations is something that cannot be overcome. The industries demand them. And the industry demands something else as well—the active co-operation of everyone engaged therein, helping to draw up the codes and taking, each one, his share in enforcing the codes.

Diversified as our fields are, we have a simple injunction to our readers. Whatever your industry, you will find in it an association. Join it, obey its rules and aid it in every way. We must not allow the throat cutter, the price slasher, and the sweater to ride free and destroy the standing of the industry.

The International Economic Conference

FOR months before it actually opened, the International Economic Conference was in the public eye. We, along with all other nations, prepared feverishly for the official opening. As far back as January, we mentioned in our columns the tentative plans being made. These plans rested mainly, according to authoritative information, on the following points:

1. Stabilization of currency
2. Removal of international trade barriers
3. Raising of prices
4. Settlement of international debts.

The Conference has opened, set to work and is now practically closed—having accomplished nothing. The first question which came up was that of stabilization of currency and this question was immediately wiped off the slate by the action of the United States. The removal of trade barriers, the revision of tariffs, could not be undertaken in the absence of stable currency because rates would mean nothing when currencies fluctuated wildly. The question of debt settlement was always viewed coldly by the United States. This left only the point of raising prices and the opposition of the gold standard countries to the ideas and actions of the nations off the gold standard was so strong that no progress could be made. Consequently the leaders of the various delegations have all returned to their homes, although research staffs are still engaged in collecting information from which they will later make recommendations. How effective these recommendations will be is anyone's guess, but a large part of the world is highly skeptical.

There is no question about the feeling abroad that it was the attitude of America which broke down the Conference. From our point of view we can only say that it was done with an eye to looking after America first, regardless of other nations. Our prices were rising, our business improving, and it is probable that the President refused to risk the immediate gain which he had in hand for what might seem a problematical gain in the future. Whether he is right or not time will tell. On the other hand historians may disagree about it for centuries.

Up to a Standard—Not Down to a Price

WITH the passage of the Industrial Recovery Act an opportunity has been given to industry to put into effect what it has needed ever since the "sellers' market" died after the war. In the sharp swing downward in 1921 and even through the subsequent rises, grew up a "buyers' market," wherein the buyer could demand products at a price. Consequently the manufacturer and the supplier were forced to fit their products to that price. Even in good times the competition was keen enough to keep the margin of profit narrow. It was volume that made money, not percentage.

Along with this movement came the curse of the past four years—the price-cutter, the manufacturer of bargains in the sweat shop and the "runaway" plant. Quality to them was non-existent. The article was made to sell at a low price, while imitating a good substantial product which it never could equal. It could only look something like it. Trade ethics went by the board. There followed also counterfeit packing and even counterfeit branding, which was in many cases, too expensive to follow up. It is easy to kill an elephant with a high powered rifle, but it is hard to chase a thousand wasps or to get them with any weapon. Nor was it possible for business men to do anything about this problem because they could not, under the Sherman law, discuss prices.

The Industrial Recovery Act has two sides. It means increased effort. It means increased cost. It sets up innumerable difficulties of operation. But it does allow one thing, which properly administered, could solve all of these problems—the discussion and setting of prices openly and aboveboard. Wages will be higher, costs will go up, but prices can be honestly set to cover them. And last but most important, products can be manufactured to a standard to bear a fair price, instead of being skimped to meet a ruinous figure.

Business will not be slow to take advantage of this tool. We are convinced also that business will play fair in setting its prices at a reasonable level. Competition can be trusted to take care of that. The important thing is that business, individually and collectively, ferret out the "gyp," the fly-by-night and the unreliable producer. It will be easy to set standards but it will take constant vigilance to make everyone in the trade live up to it. That is the job ahead of business.

Correspondence and Discussion

Coreless Induction Furnaces

To the Editor of METAL INDUSTRY:

We note on pages 202, 203 of METAL INDUSTRY for June, 1933, some remarks on the coreless induction furnace for non-ferrous metal melting.

There are a few remarks which are perhaps misleading and I believe that it is in order for you to take the matter up with Mr. R. H. Stone, whose name appears at the head of the article.

The "focal inductor" (properly called **focus** inductor) referred to in the first line, page 203 has not thus far been used commercially when made of Nichrome or Monel metal, either in whole or in part. Neither is such a device commercially used for melting either non-ferrous or ferrous metal. We believe that the entire paragraph about the "focal inductor" could well be omitted.

The remarks in the first sentence under "Advantages and Disadvantages . . . ." speaks of the necessity for a small unit with the use of the condenser set. This implies the use of 60 cycle induction for coreless furnaces which has been found to be impractical, especially for a "small unit." The remark about the danger of high voltage at low frequencies is, therefore, out of order.

The statement at the end of the second paragraph in the second column on page 203 to the effect that high aluminum and zinc alloys of some types cannot be melted satisfactorily is entirely untrue. One of our customers, who ordinarily melts steel, melted one or more heats of aluminum in a strictly non-conducting lining with the greatest ease. The melting of aluminum in a conducting or partially conducting clay-graphite crucible is also practical. There is no reason whatever why zinc alloys of any zinc content cannot be melted.

It would have been desirable for Mr. Stone to have submitted his copy to us for suggestions before publication. It is our suggestion now that he should submit any statement of correction to us for approval.

We note that he refers to our furnace as the Ajax-Northrup in figures but we do not see that the Ajax-Wyatt furnace is so named anywhere in the article.

We believe that it would be a fitting courtesy to the Ajax companies to make some recognition of their contribution to the art of melting.

Trenton, N. J. AJAX ELECTROTHERMIC CORPORATION,
Dudley Willcox,
Treas. & Ass't. Gen. Mgr.

To the Editor of METAL INDUSTRY:

Your letter of June 19th forwarding copy of letter from the Ajax Electrothermic Corporation has been received. As regards the criticisms of the serial article on Melting Equipment in the Non-Ferrous Industry, we are really quite pleased to have this evidence that the articles are being critically read. We would be glad to have you publish anything in regard to the article that may come in. If there are any errors in our paper they ought to be corrected and any additional information that is forthcoming will be just so much more helpful to the foundrymen for whose benefit the article was prepared.

Regarding the specific questions raised in the letter signed by Mr. Wilcox, the focal inductor, which the article says may be used, was discussed by Dr. Northrup in a paper printed in Vol. 35 of the Transactions of the American Electrothermical Society. Instances of the use of the "focal" or "focus" inductor in induction furnaces for melting non-ferrous metals are given on page 152, and on page 153 Dr. Northrup states that the part of the inductor near the crucible is made of Monel metal and the outer portion of copper.

Doubtless Mr. Wilcox's remarks regarding 60 cycle furnaces applies to the Northrup coreless induction furnace, whereas our article applies to the field in general.

We are interested to note that one user of the induction furnace melted aluminum under certain conditions. We had no intention in the article of conveying the impression that there are any metals which cannot be melted in the coreless induction furnace. Whether it is advisable or economical to do so is sometimes doubtful.

Appreciating your giving us the opportunity to discuss the criticism submitted, I remain,

Swissvale, Pa. RICHARD H. STONE,
Chemical Engineer.

Plaster of Paris Molds

To the Editor of METAL INDUSTRY:

In your shop problems in the April number of Metal Industry, a question was asked relative to making bronze memorial tablets in plaster of paris molds and in which you made reply that you had no record of same being done.

Kindly be informed that memorial tablets, architectural bronzes, plaques, statuettes, etc., are successfully being made today in plaster of paris molds from statuary bronze composed of 83 copper, 5 tin and 12 zinc, this being made possible by a simple process. Pure plaster of paris is used which hardens like stone when mixed to the consistency of a syrup so it will just pour, and is allowed to set and the patterns removed. It becomes still harder when baked. This is necessary for the reason that plaster paris molds when baked under ordinary conditions are so soft that the tin cuts into the plaster and makes a rough unacceptable casting. For this reason a brass with a high zinc content is used.

Bradley Beach, N. J. EDWARD D. GLEASON.

Technical Papers

"Tin-Free" Leaded Bearing Bronze, by H. K. Herschman and J. L. Basil, Bureau of Standards. Research Paper No. 551. Superintendent of Documents. 5 cents.

Abstract:—A study was made of the effect of small proportions of various elements on the distribution of lead in leaded bronzes containing more than 30 percent lead. The mechanical properties believed to be significant in the service of a bearing were determined at several different temperatures for leaded bronzes developed in the course of this investigation and which contained 30.5 to 40 percent lead, together with small amounts of sulphur, silicon, and zirconium. The mechanical properties of several commercial leaded bronzes containing 26 to 40 percent lead were also determined. Service tests were made on a set of connecting-rod and main bearings of the sulphur-silicon-zirconium leaded bronze installed in a Wright type J-5 airplane engine.

Government Publications

United States Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, apply to governmental body responsible for publication.

Phosphor Bronze Bars, Plates, Rods, Shapes, Sheets and Strips. Federal Specifications Board, Washington, D. C. Proposed federal specifications. Comments of interested parties desired at once.

Black and Zinc Coated (Galvanized) Iron and Steel Sheets. Federal Specifications Board, Washington, D. C. Proposed federal specification. Sheets on request to board.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

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Electroplating, Polishing, and Metal Finishing

O. J. SIZELOVE — A. K. GRAHAM, Ph.D.
G. B. HOGABOOM — WALTER FRAINE

Casting Cored Bars

Q.—As a subscriber to your journal we would like to ask if you could give us details of the American practice for producing sand cores such as are used in the production of chill cast phosphor bronze cored bars.

We are anxious to obtain information about the very latest labor saving process for the production of these cores. The standard length is 24".

A.—Most of the bronze tubes made from phosphor bronze in this country are made by centrifugal casting. You will find articles and calculations by R. F. Wood, metallurgical engineer, in The Metal Industry, May, 1925, July, 1925 and Dec. 1925, that may be of interest to you.

When casting has been done in iron molds, the core is made on an arbor. When large tubes are cast, the core arbor is first wound with hay rope and then covered with a loam sand, baked and dressed, and then placed in mold with suitable locaters for steadying the core.

Another method used in this country is to place a pattern in an iron tube, leaving about 1½" clearance all around, and ram with core sand. Draw pattern dry and wash with silica flour. Dry sand core made on arbor, or solid cores are used. The trouble found with casting in chill molds has been shrinkage next to the core. It appears that the metal chills on the outside as it comes in contact with the iron and stays open next to the core, and the chill surface draws from the fluid metal that is delayed in chilling as the core seems to hold the heat.

There are some tubes cast in iron molds, using sand cores. They do, however, have trouble with shrinkage. The sand lined iron mold is very satisfactory, also the centrifugal casting of tubes. W. J. R., Problem 5,219.

Black on Die Casting

Q.—We are enclosing a sample of an item made of die-cast metal and we would be pleased to know the formula and method of oxidizing the same, so as to produce a jet black color. It should be a method which will oxidize the metal deeply enough that it will not scratch down to the bright surface easily.

A.—A black finish can be produced upon a zinc die casting by using the following solution:

Single nickel salts	4 ozs.
Ammonium chloride	6 ozs.
Ammonium Sulphocyanide	2 ozs.
Zinc chloride	½ oz.
Water	1 gallon

Use the solution at a temperature of 100° F. and immerse the work for 30 to 60 seconds. After the work is dried, if it is oiled by using a light oil such as paraffine oil the black color will be intensified. O. J. S., Problem 5,220.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....**Employed by:** .....

Kind of solution: .....**Volume used:** .....

Tank length: .....**width:** .....**Solution depth:** .....

Anode surface, sq. ft.:.....**Cathode surface, sq. ft:** .....

Distance between anode and cathode: .....**Kind of anodes:** .....

Class of work being plated: .....**Original formula of solution:**.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. ——————————

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY. 116 John Street, New York City.

Pitted Nickel

Q.—I am having trouble with my Nickel Solution, so I am sending a sample for analysis. I have been told to take my trouble to you, as I am just a beginner. This solution plates very streaky and pits. I can't get enough current through the generator. We used this generator for a year with good results. Now I have had it fixed but don't get results. Formerly I had been getting 3 volts with 3 levers and I have to use 5 levers now to get 3 volts. Do you think this is caused by the solution? The man that has been taking care of the generator, said it must be in the solution.

A.—Analysis of nickel solution:

Metallic nickel	3.79 ozs.
Chlorides	4.33 ozs.
pH	5.2

The metal and chloride contents are satisfactory, but the pH is too low. Add to the 200 gallon solution 48 fluid ozs. of 26° ammonia and 1 gallon of 30 volume hydrogen peroxide. After making this correction to the solution, stir thoroughly and let stand over night before using.

O. J. S., Problem 5,221.

Finishing Bronze

Q.—We are mailing to you under separate cover a small medal. This medal has a finish that we have been asked to reproduce on a bronze tablet. Being neither metallurgists or expert finishers, beyond our standard practice of making bronze memorial tablets, we are at a loss to know how to satisfy our prospective customer.

We are using a mixture in our bronze tablets consisting of copper 90%, tin 9%, lead 1%, and liver of sulphur applied hot to oxide the background, after which the high lights are polished. This, however, does not meet with the approval of our prospect. If you can tell us how to reproduce a job like the medal, we will appreciate it.

A.—To produce the finish as submitted sample, two solutions are necessary. One is a copper sulfate solution made by dissolving 4 ozs. of copper sulfate in 1 gallon of water. The other solution is made by dissolving 2 ozs. of liver of sulfur in 1 gallon of water. Both solutions are used cold.

The procedure is as follows. After the work is thoroughly cleaned by using an alkaline cleaning solution, the work is placed in the copper sulfate solution for a few seconds, and then without rinsing, placed in the sulfur solution for a few seconds, then rinsed in clean cold water and repeat operations until color is dark enough.

A light shading operation is necessary and this is done by using a soft rag wheel moistened with water and fine pumice stone. This will leave the highlights lighter in color than the background. To preserve the finish the work should be waxed.

O. J. S., Problem 5,222.

Slow Nickel Solution

Q.—We have a nickel solution which takes 2 hours to give a satisfactory plate. Also it peels occasionally. How can we speed up and improve the solution? We are sending a sample.

A.—Analysis of nickel solution:

Metallic nickel	1.60 ozs.
Chlorides	3.33 ozs.
pH	5.8

The metal content is low and should be increased by adding 100 lbs. of single nickel salts to the 300 gallons of solution.

From the analysis of the solution we are inclined to believe that the peeling of the nickel deposit is due to faulty cleaning nethod.

O. J. S., Problem 5,223.

Whitening Steel Pins

Q.—On page 205 of the June issue of Metal Industry is an article on whitening steel pins in which is mentioned that tinning is done in a cream of tartar tin solution such as used for brass pins.

While we presume this cream of tartar tin solution is used in an electroplating process, we would appreciate receiving your advice, together with formula and information where some of the ingredients may be secured in case they are not commonly carried by platers' supply houses.

A.—The cream of tartar tinning method that you refer to is an immersion process, and not electroplating. A very thin deposit of tin is obtained with this process.

Formula for solution:

Cream of tartar	2 ozs.
Sodium chloride	4 ozs.
Water	1 gallon

The work which must be absolutely clean is placed in thin layers or iron trays covered with perforated sheets of pure tin in the solution which is heated by steam coils in a copper tank to a temperature of 195° to 200° F. for 2 to 4 hours. A fresh solution is used for each bath of work.

The chemicals can be purchased from any chemical or platers supply house.

O. J. S., Problem 5,224.

Pin Holes in Bronze Castings

Q.—We have been making various kinds of slush mold castings and small pin holes appear on the drag side of the castings.

These castings are usually ¾ to 1 inch thick; the facing is made of molding sand and glutrin and the mold face dried.

The metal used is a standard grade of 85% copper, 5% tin, 5% zinc and 5% lead. The metal is fluxed with borax and a small percentage of phosphor copper, about 1 ounce to 50 pounds of metal, with a small amount of pure litharge.

Would like to have some suggestion as to what can be used to eliminate these pin holes.

A.—From your description, your practice seems very good and handled properly in melting. You should have no trouble with pin holes, so the first thing necessary in the procedure is to test the raw material. Only the purest and best material should be used.

Second: good metal can easily be ruined by bad melting due to insufficient care and control at the vital stage. The casting temperature has a marked effect on the final casting. The temperature limits for successful results can be determined by your foreman and these pouring temperatures strictly enforced. Keep your pyrometer in constant use on such work.

We, therefore, assume your trouble is in the metal or the handling of same. We suggest you try the use of new metal. Use electrolytic copper ingot, Straits tin, pig lead, and good virgin zinc. Melt the copper first. Do not let any of the metal stick out of the crucible. Melt quickly, and add a handful of common salt to the copper. When melted, add the tin, then the lead, then the zinc. Stir well and keep metal covered with charcoal or borax.

If you are using 85-5-5-5 ingot metal, add a handful of salt and melt quickly, in addition to the flux you are using, which we think is very good. We are also of the opinion you will find the use of the pyrometer very helpful.

W. J. R., Problem 5,225.

Silver Analysis

Q.—I am sending a sample of my 165 gallon silver plating solution for analysis. I find that my anodes begin to get dark after an hour's use, and whiteness is restored by dipping in hot water. If this is not done they get black, and the voltage goes up. I do hotel ware.

A.—Analysis of silver solution:

Metallic silver	3.01 oz.
Free cyanide	7.53 oz.
Carbonates	14.04 oz.

The metal content is satisfactory, and so would the free cyanide be if the carbonate content were not so high. When the carbonate content is so high, a greater amount of free cyanide is necessary. We would suggest that you add 3 ounces of sodium cyanide to each gallon of solution. This will overcome the trouble until the carbonates can be removed. It is best to freeze the carbonates out, and this should be done in the winter time when the temperature gets to 28 or 30 above zero, Fahrenheit.

O. J. S., Problem 5,226.

Patents

A Review of Current Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,911,111. May 23, 1933. **Die-Casting Machine.** William J. During, Syracuse, N. Y., assignor to Precision Castings Company, Inc., Syracuse, N. Y.

1,911,188. May 30, 1933. **Process for Separating and Recovering of Lead from Tin or Tin Alloys.** Albert H. Anak, Philadelphia, Pa.

1,911,312. May 30, 1933. **Silver Burnishing Machine.** Frederick C. Good, Philadelphia, Pa.

1,911,537. May 30, 1933. **Coating Metal with an Organic Salt of the Metal.** Robert R. Tanner, Detroit, Mich., assignor to Metal Finishing Research Corporation, Morenci, Mich.

1,911,604. May 30, 1933. **Electrolytic Process for the Recovery of Lead from Waste Materials.** John H. Calbeck, Joplin, Mo.

1,911,726. May 30, 1933. **Production of Phosphate Coatings on Metals.** Robert R. Tanner and Herman Johan Lodeesen, Detroit, Mich., assignors to Metal Finishing Research Corporation, Detroit, Mich.

1,911,886. May 30, 1933. **Process for the Manufacture of Fusible Electrodes for Electric Arc Welding of Aluminum and the Like Having a Saline Coating.** Ferdinand de Pape, Brussels, Belgium, assignor to La Soudure Electrique Autogene, Ste. Ame, Brussels, Belgium.

1,912,175. May 30, 1933. **Alkaline Detergent Compositions and Method of Rendering the Same Non-Corrosive to Aluminum.** Earl Blough, Pittsburgh, and Harry V. Churchill, Parnassus, Pa., assignors to Aluminum Company of America, Pittsburgh, Pa.

1,912,382. June 6, 1933. **Method of Making and Casting Aluminum Alloys.** Joseph A. Nock, Jr., Tarentum, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,912,400. June 6, 1933. **Electroplating Apparatus.** William J. O'Neill, River Forest, Ill., assignor to Mercil Plating Equipment Company, Chicago, Ill.

1,912,421. June 6, 1933. **Colored Lacquer.** Bodo Zschimmer, Ludwigshafen-on-the-Rhine, Germany, assignor to I. G. Farbenindustrie Aktiengesellschaft, Frankfort-on-the-Main, Germany, a Corporation of Germany.

1,912,712. June 6, 1933. **Copper-Lead Alloy Process.** Frederick A. Kormann, Glendale, Calif., assignor to Industrial Research Laboratories Ltd., a Corporation of Nevada.

1,912,981. June 6, 1933. **Method of Pressure Casting and Means Therefor.** John E. Hoy, Midland, Mich., assignor to The Dow Chemical Company, Midland, Mich.

1,913,071. June 6, 1933. **Apparatus for Pouring Melted Metal Under Pressure.** Reinhardt Harald Valdemar Christensen, Copenhagen, and Richard Smith Dahl, Gentofte, Denmark.

1,913,133. June 6, 1933. **Coalescence of Metals.** Harry H. Stout, Ardsley-on-Hudson, N. Y., assignor to Copper Deoxidation Corporation, New York, N. Y.

1,913,394. June 13, 1933. **Material for Welding Wrought Aluminum Alloys.** Edwin Joyce, Upper Darby, Pa.

1,913,423. June 13, 1933. **Precious Metal Alloy.** Edmund M. Wise, Jersey City, N. J., assignor to The International Nickel Company, Inc., a Corporation of Delaware.

1,913,846. June 13, 1933. **Noncorrodible Aluminum Alloy.** William E. McCullough, Detroit, Mich., assignor to Bohn Aluminum & Brass Corporation, Detroit, Mich.

1,913,956. June 13, 1933. **Electroplating Apparatus.** Hedley J. Richards and William E. Hinton, St. Louis, Mo., assignors to Lasalco, Inc., St. Louis, Mo.

1,913,985. June 13, 1933. **Refining of Lead Alloys.** Thomas E. Harper, Jr., and Gustave Reinburg, Jr., La Oroya, Peru, assignors to Cerro de Pasco Copper Corporation, New York, N. Y.

1,914,269. June 13, 1933. **Method of Applying Metal Coatings.** Tadeusz Liban, Cracow, Poland.

1,914,054. June 13, 1933. **Soldering Tool for Aluminum and Aluminum Alloys.** Arthur Ulrich, Zurich, Switzerland.

1,914,354. June 20, 1933. **Electric Induction Furnace.** William Adam, Jr., Abington, Pa.

1,914,367. June 20, 1933. **Zinc Base Alloy.** John R. Freeman, Jr., Waterbury, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,914,588-9. June 20, 1933. **Magnesium Base Alloys.** Robert T. Wood, Lakewood, Ohio, assignor, by mesne assignments, to Magnesium Development Corporation, a Corporation of Delaware.

1,914,716. June 20, 1933. **Copper Melting Furnace.** Russell P. Heuer, Haverford, Pa., assignor to The American Metal Company, Limited, New York, N. Y.

1,914,717. June 20, 1933. **Copper Melting Furnace Method.** Russell Pearce Heuer, Haverford, Pa., assignor to The American Metal Company, Limited, New York.

1,914,788. June 20, 1933. **Method of Refining Lead for Use Thereof in Antifriction Alloys Containing Other Metals Which are Not Adapted to Be Alloyed With Lead.** Alfred Edouard Ricard and Louis Daniel, Paris, France.

1,914,843. June 20, 1933. **Process for the Heat Treatment of Noncementable Metals.** Walter Beck, Frankfort-on-the-Main, Germany, assignor, by mesne assignments, to E. I. du Pont de Nemours and Company, a Corporation of Delaware.

1,915,152. June 20, 1933. **Process for the Recovery of Copper from Spent Reaction Masses.** William S. Calcott, Penns Grove, N. J., Julius A. Nieuwland, Notre Dame, South Bend, Ind., and Frederick B. Downing, Carneys Point, N. J., assignors to E. I du Pont de Nemours & Company, Wilmington, Del.

1,915,212. June 20, 1933. **Alloy.** Andrew J. Boyles and Floris M. McKinley, Clarksburg, W. Va.

1,915,932. June 27, 1933. **Magnesium-Cerium Alloy.** Karl Hiege, Bitterfeld, Germany, assignor, by mesne assignments, to Magnesium Development Corporation, a Corporation of Delaware.

1,915,999-001. June 27, 1933. **Nonferrous Alloy.** Herbert C. Jennison, Bridgeport, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,916,087. June 27, 1933. **Aluminum Alloy.** Court C. Titus, New York, N. Y.

1,916,496. July 4, 1933. **Method of Making Lead Alloys.** Robert J. Shoemaker, Chicago, Ill., assignor to S. & T. Metal Company, Chicago, Ill.

1,916,503. July 4, 1933. **Process of Cleaning Metal.** Austin B. Wilson, Flint, Mich., assignor to General Motors Corporation, Detroit, Mich.

1,916,758. July 4, 1933. **Air Controlling Mechanism for Paint-Filtering Apparatus.** Frank N. George, Buffalo, N. Y.

1,916,759. July 4, 1933. **Buffing Wheel.** Elisha Winthrop Hall, Marshfield Hills, Mass.

1,916,989. July 4, 1933. **Wire.** Harold K. Rader, Port Huron, Mich., assignor to Mueller Brass Co., Port Huron, Mich.

1,916,991. July 4, 1933. **Long Stock Fabricating Machine.** Joseph H. Roberts, Waterbury, Conn., assignor to F. B. Shuster Co., Inc., New Haven, Conn.

1,917,022. July 4, 1933. **Electrochemical Process for Cleaning Metal.** Thomas E. Dunn, Bridgeport, Conn., assignor to The Bullard Company, a Corporation of Connecticut.

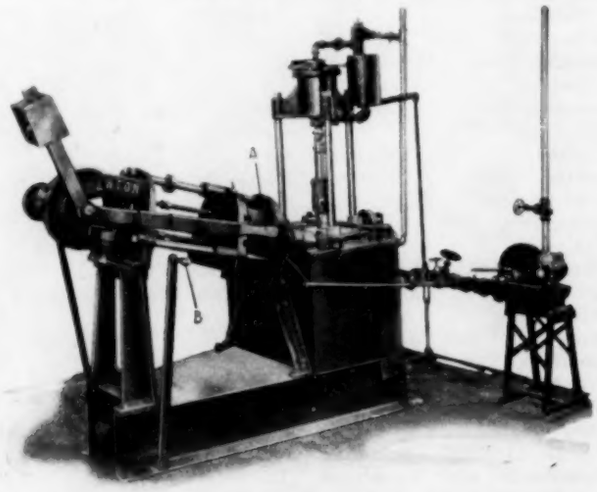
1,917,188. July 4, 1933. **Process of Electro-Depositing Chromium.** William S. Eaton, Sag Harbor, N. Y., assignor of one-half to Walter W. Burns, Washington, D. C.

Equipment

New and Useful Devices. Metals. Machinery and Supplies

New Casting Machines to Cut Casting Costs

Newton-New Haven Company, New Haven, Conn., recently introduced three radically new types of die casting machines, designed, built and priced to compete with the common practice of using gated-patterns and sand casting for non-ferrous alloys. These new machines are said to be particularly advantageous for short runs of widely diversified castings; also to be equally effective for continuous operation when thousands of duplicate castings are required.



Newton-New Haven Casting Machine

They can be quickly changed from job to job or set up for long production periods.

In one respect the Newton-New Haven Die Casting Machines are similar to equipment used by commercial die casters; they employ the positive plunger injection principle which years of commercial die casting experience with millions of castings has proved to be the most practical injection method.

One of these new die casters is hand operated, another is semi-automatic and the third is full-automatic. On both the hand and semi-automatic types there are but two levers used when machines are in operation; on the full-automatic there is only one. The semi-automatic machine here illustrated, plainly shows the two controls. Lever A is raised or lowered to open or shut the die, lever B is moved to the left to make a "shot," is returned by a spring which at the same time operates the air valves to raise the injector plunger to self-loading position. Casting speed is thus limited only to the speed of the operator and can run as high as 400 to 500 shots an hour on short runs or 600 to 700 shots an hour on continuous production runs. With the hand machine, production rates are somewhat lower and with the full-automatic the rates are considerably higher.

In the hand and semi-automatic models the dies are quickly closed with high pressure by hand but without exertion by the operator. In the full-automatic type, die closing is electric motor driven by clutch and safety trippers. In the semi-automatic model the injector plunger is operated by a specially designed cylinder which uses but one charge of air at 100 lbs. pressure for both injection and plunger return. This is a marked economy. Interlocks on all machines prevent casting shots from being made before dies are locked closed.

Another economy feature claimed is in the low tooling costs for these machines. Although all three machines will take dies up to 9 inches by 12 inches by 9½ inches deep much smaller dies can be used and a proportional die cost saving can be made. For short runs the low cost of the single impression dies which can be used on these machines bring casting costs down abruptly. For long runs, or where short runs warrant, multiple impression dies can be used even further to increase the high production economies which are readily obtained. And since it is stated that any complete change of dies regardless of size can be made within 20 minutes or less, it is practical to use this machine for a wide diversity of castings. This is claimed as a unique feature of Newton-New Haven Die Casting Machines.

With the exception of the dies, each machine is shipped complete, ready to run. Standard equipment includes furnace, chassis, gas firing equipment, pyrometer, die clamps, integral ejectors, Zerk lubrication and all other parts essential to immediate operation to full capacity.

A New Metal Cleaner

A new type of metal cleaner is being made by the Trojan Products and Manufacturing Company, 3101 S. Wabash Avenue, Chicago, Ill., which can be used on steel, brass, bronze, die castings, aluminum and copper. It is said that this cleaner which is harmless to skin and clothing, eliminates all scrubbing and the use of pumice, lime, brushes, etc. The material, which is not a powder, and which it is claimed, dissolves instantly, is recommended for the removal with or without current, of all greases, oils, tallow, Tripoli, parafine, drawing compounds and burnishing compositions. The solution operates at 180°

Needle Files

The American-Swiss File & Tool Company is manufacturing and placing on the market something new in the line of needle files. They manufacture a needle file with a knurled handle or tang in place

New Swiss Needle File

of the old style smooth, round handle or tang. The knurling prevents slippage and assures a firm grip without cramping the fingers and hand of the user.

These files are made in all the regular shapes and sizes at a no higher price than the old style.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Portable Platform Scale. Has platform 21x29, with platform designed not to overhang suspension loops, permitting extra loads to be placed on edges without affecting accuracy; levers have no lateral movement; has bakelite-rubber wheels, and one-cam translation mechanism. Kron Company, Bridgeport, Conn.

New Alloy for Rolls

Phoenixloy is a new alloy cast iron roll for use in rolling mills where extreme hardness and unusual strength is required. This roll was developed primarily to overcome end marking in rolling light gauge strip on four-high continuous mills. They are made by the Pittsburgh Rolls Corporation, Pittsburgh, Pa.

The hardness of the face of the roll is said to be very uniform, between 80 and 90 scleroscope.

The matrix of the metal has a hardness approximating that of the carbides as indicated by the scratch test magnified three thousand diameters. This accounts for the absence of the so-called orange peel surface which is so undesirable, especially on rolled brass. The hardness of the roll at the center is approximately fifteen points less than on the surface.

Recording Instruments

A very interesting line of graphic instruments of the electrical type is being made by the Esterline-Angus Company, Indianapolis, Ind. These instruments are used for checking many non-electrical quantities such as the operation of machines and processes. For example, although a wattmeter is generally understood to be an electrical instrument, it may still be used to guide the operation of a stirrer in a molten metal bath by showing the consistency of the metal as a function of the power input to the driving motor. Likewise the same wattmeter may be used to study the tooling and to determine the set-up of an automatic screw machine turning brass.

Applications for the use of such devices are numerous and varied. Some of the special instances have been (1) in connection with automatic machines for the purpose of reducing costs; (2) in connection with large machines for studying the cycle of operation with a view to increasing the uniformity of the process; (3) in connection with taking records for the purpose of determining idle and productive time on machinery.

New Enamel Products

The Ferro Enamel Corporation of Cleveland, Ohio, announces that it is opening up a new field for commercial enameling in co-operation with the Copper and Brass Research Association of New York City. This company is enameling on copper according to new formulas, developed by the Association. Previously, the art of enameling on copper was limited to jewelry and small objects but this old art is now being extended to new uses in industry.

The Ferro Enamel Corporation has merged its furnace building interests with those of the Surface Combustion Company of Toledo. The latter company will install and engineer the porcelain enameling furnaces which the Ferro company has developed over a period of ten years.

New Burnishing Barrel

The Hanson-Van Winkle-Munning Company, Matawan, N. J., is offering a new burnishing barrel called the Mercil Type barrel. All gearing is enclosed. No sharp edges, corners of castings or revolving yokes are exposed. A smooth turned cover is practically the only visible moving part. The danger of injury to anyone working around the machine is said to be practically eliminated, without auxiliary guards.

Unlike the cast barrel, the welded steel cylinder is of uniform thickness all through its construction. It is considerably lighter and stronger than cast iron and is well balanced. When in operation, revolves in four Timken Bearings, thereby requiring very little power, which is only used while the cylinder is in actual operation.

New Mercil Type Barrel

Releasing two tension screws on the cover assembly and with the use of the cover lifter and holder, the job of removing and replacing the cover is said to be a matter of seconds.

As the roller bearings are all enclosed and practically dust proof, the matter of lubrication is necessary only a few times a year, depending on the hours per day that the apparatus is operated.

The only expense incurred in setting up this apparatus is to place it in a level position on any floor, bolt it to the floor, make one electrical connection to the motor starting switch and the apparatus is then ready for use. The lining blocks are shrunk into the barrel at the factory and are kept in a moist condition until ready to use. No countershafts have to be hung, no belting has to be purchased, cut, stretched and recut. There are no switch boxes to install and no balancing or adjusting necessary after installation.

Equipment and Supply Catalogs

Available free on application to the manufacturers mentioned, unless otherwise stated. Please mention this notice.

Industrial Tires. The B. F. Goodrich Rubber Company, Akron, Ohio. Leaflet on tires for industrial motor and other trucks.

Alumilite. Aluminum Colors, Inc., 537 East Washington Street, Indianapolis, Ind. Leaflet on a protective color coating for aluminum.

Motors. General Electric Company, Schenectady, N. Y. Bulletin GEA-1765, Fractional-horsepower Gear-motors, 500 to 11 r.p.m.

Trichlorethylene. International Selling Corp., 70 Pine Street, New York. Booklet on material for cleaning, degreasing, etc. Illustrated.

X-Ray for Industry. Industrial X-Ray Corporation, Chamber of Commerce Building, Los Angeles, Calif. Illustrated catalog of "Metalix" shockproof, portable equipment.

Nichrome. Driver-Harris Company, Harrison, N. J. Bulletin R-33, compiled as an aid in selection of alloys for electrical, mechanical and chemical purposes. Complete with engineering data, tables, illustrations, etc. 25 cents a copy.

Grinding Wheel Specifications. Norton Company, Worcester, Mass. Comprehensive 104-page booklet of data on wheel specifications for grinding machines of all makes, corrected to conform with the simplified revised standards of the Department of Commerce.

Operating Manual for Plating with Cad-A-Loy. R. & H. Chemicals Department, E. I. du Pont de Nemours & Company, Wilmington, Del. An informative treatise on this cadmium-mercury process for plating iron and steel. Gives complete information on preparation of solution, operating conditions, replenishing, bath analysis, testing of coatings, cleaning of work prior to plating, etc.

Tumbling, Rolling and Barrel Burnishing. Magnus Chemical Company, Garwood, N. J. A highly useful treatise on a subject about which too little is known. It is by R. W. Mitchell, technical director of the company, which is a large maker of industrial cleaners and tumbling and burnishing supplies. The 48-page booklet is well illustrated throughout and gives a very clear and complete exposition of the subject. Free on application to the Magnus Company.

News of Associations and Societies

Electrochemical Society Convention

The Electrochemical Society, headquarters Columbia University, New York City, will meet in convention at the Stevens Hotel, Chicago, Ill., September 7-9, 1933. It is urged that reservations at the hotel be forwarded promptly as the demand has been very great, due to the Century of Progress fair.

The convention is featuring this year the International Convocation on Corrosion, which has attracted world-wide attention, and a record attendance is anticipated.

Convention Program

The program of the convention includes a large number of papers on various phases of electrochemistry and electro-metallurgy.

A number of social events are scheduled, such as luncheons, a dinner dance, trips to the fair, presentation of the Acheson Medal to Dr. Fink (see page 290), and a Faraday Centennial Celebration at which Dr. Robert S. Hutton, noted British scientist and charter member of The Electrochemical Society, will deliver an address on "Michael Faraday's Contributions to Electrochemistry."

The program of papers includes the following of interest to our readers:

Thursday, September 7

"The Scientific Study of Protective Painting" by S. C. Britton and Ulick R. Evans.

"Electrodeposition of Iron, Copper and Nickel Alloys. Part 3. Deposition from Alkaline Sulfate Solutions" by L. E. Stout and Charles L. Faust.

"The Adhesion of Electrodeposited Coatings to Steel" by A. W. Hothersall.

"The Effect of Composition and Pre-Treatment of Steels upon the Life of Protective Coatings" by Karl Daeves.

"Chromium Plating from Ammonium-Chromate-Sulfate Baths" by Raymond R. Rogers and Joseph F. Conlon.

"The Electrochemical Theory of Corrosion" by Oliver P. Watts.

Friday, September 8, "Faraday Day"

Papers on Electrodeposition and Electric Furnaces will be presented in the Auditorium of the Illinois Building, Prof. S. C. Langdon, Chairman. Included are:

"A Study of the Manganese-Tin Alloys at Room Temperature" by Alan N. Campbell and H. Dyson Carter.

"The Electrodeposition of Magnesium" by D. M. Overcash and F. C. Mathers.

"Thorium Oxide, a High Temperature Refractory" by Oscar O. Fritsche, H. B. Wahlin and Joseph F. Oesterle.

"The Rate of Solution of Magnesium in Acids" by Martin Kilpatrick, and J. Henry Rushton.

"Throwing Power and Current Efficiency of the Nickel Plating Solution at Low and High pH" by R. E. Harr.

"A New Bath for the Direct Nickeling of Zinc" by George W. Nichols.

"Electrodeposition of Aluminum from Non-Aqueous Solutions" by R. D. Blue and F. C. Mathers.

Dr. H. C. Cooper, 155 East Ohio Street, Chicago, Ill., is busily engaged in making preparations for this sixty-fourth convention. Full information regarding the meeting can be obtained either from Dr. Cooper or the Secretary's office in New York.

New Jersey Foundrymen

The board of directors of the New Jersey Foundrymen's Association met in June and elected the following officers:

President, H. L. Edinger, Barnett Foundry and Machine Company, Irvington, N. J.

Vice-President, P. R. VanDuyne, Meeker Foundry Company, Newark, N. J.

Treasurer, J. A. Williamson, Isbell-Porter Company, Newark, N. J.

Secretary, G. W. Hannay, Barnett Foundry and Machine Company, Irvington, N. J.

First meeting of the new year will be held October 25, 1933. Address of secretary, Barnett Foundry and Machine Company, Irvington, N. J.

G. W. Hannay, Secretary.

Waste Material Dealers

Directors of the National Association of Waste Material Dealers, Inc., at a special meeting June 30 approved all preliminary steps taken by its temporary committee under the National Industrial Recovery Act. It was resolved that the Association cooperate in drawing up a code or codes to be prepared by a coordinating committee representing every branch of the waste material industry.

The committee was authorized to negotiate with other associations in the industry for the purpose of consolidating, if possible, all codes presented in behalf of the waste material industry. It authorized appointment of a committee to cooperate with the Nonferrous Ingot Metal Institute and the Aluminum Research Institute in the preparation of a code covering the secondary metal industry.

The National Association of Waste Material Dealers proposes to scrutinize and analyze every code which in any way affects the interests of those engaged in the waste material industry in order that no code may be approved which places unfair or unequitable restrictions on any branch of the industry.

American Electroplaters' Society

New York Branch

Officers of the New York Branch were installed for the coming year at the June 9 meeting, as follows: John Rolfe, president; George Wilson, vice-president; John Sterling, secretary-treasurer; Arthur Wallace, recording secretary; Ralph Liquori, librarian; Samuel Goldstein, sergeant-at-arms; Harry Carlin, assistant sergeant-at-arms; Messrs. Fisher, Macstoker and Stremel, trustees.

After a short routine business session, refreshments were served, and a really sociable evening was spent.

At the meeting June 23, Charles H. Proctor read a very interesting paper by Professor Mathers on "Conditions that Cause Changes in Plating Baths." Mr. Proctor afterward announced his intention of taking an ocean trip for his health, and was given the best wishes of the branch for a happy voyage and an early return to continue his good work for the A. E. S.

The Branch was highly interested in the events at the recent annual convention of the national society, at Chicago. It is felt that the conventions are a wonderful medium for exchange of information and ideas as well as for making and renewing friendships between members of the industry. The New York Branch feels it should congratulate the Society on its great success in holding the convention in spite of the existing conditions.

The meetings of the New York Branch are always very interesting. They include discussions of plating methods and solutions, and it is the desire of the branch to increase the benefits of the meetings to the members to such an extent that record attendance will be assured.

Arthur Wallace, Recording Secretary.
215 Maple Street, Brooklyn, N. Y.

Personals

Dr. Colin G. Fink

Dr. Colin G. Fink, widely known for his development of commercial chromium plating, was this year awarded the Edward Goodrich Acheson Medal of The Electrochemical Society for his achievements in electrochemistry.

Colin Garfield Fink was born at Hoboken, N. J., December 31, 1881. In 1903 he graduated from Columbia University with a B. A. degree, and proceeded to Leipzig, Germany, to continue his education. In 1907 he took M. A. and Ph.D. degrees at the University of Leipzig, where for the preceding year he had been an assistant on the faculty of electrochemistry. He returned to the United States, and joined the General Electric Company at Schenectady, N. Y., as a research engineer.

At the General Electric laboratories, where Dr. Fink spent three years, he performed a great deal of electrochemical and electrometallurgical research. Among his achievements was the discovery of ductile tungsten, which revolutionized the manufacture of incandescent lamps, audions and similar products. In 1910, at the General Electric Company's Edison Lamp Works at Harrison, N J., he introduced the new process for making the tungsten filaments. Along with it he perfected what is known as the Fink "platinum substitute," which is also used in incandescent lamp and audion manufacture.

Dr. Fink stayed at the Edison Lamp Works from 1910 until 1917, when he became head of the research laboratory of the Chile Exploration Company, large copper producer. His great contribution to the copper industry is the insoluble copper anode, today widely used in electrolytic refining of copper. Dr. Fink also gave attention to reduction of tin ores, and developed a new and highly improved process for smelting and refining tin by electrometallurgical methods.

In 1922 Dr. Fink left Chile Exploration to become head of the department of electrochemistry and professor of chemical engineering at Columbia University.

During the years since 1922 Dr. Fink has performed the work for which he is probably best known to readers of METAL INDUSTRY, the development of the first commercially feasible process of chromium plating. Another Fink development of interest to our readers is tungsten plating, which promises to become a commercial success through the work Dr. Fink has done. He has also developed an electrochemical process for rustproofing steel. A highly interesting achievement is his method of restoring ancient metal objects such as coins which have been corroded into complete unrecognizability. This work he did for the Metropolitan Museum of Art in New York.

Dr. Fink was president of the American Electrochemical Society for a term, and for many years has been its secretary. (It is now known as The Electrochemical Society). He is also a member of the American Institute of Mining and Metallurgical Engineers; the National Research Council; the Metropolitan Museum of Art. He has been

DR. COLIN G. FINK

editor of "Electrochemistry" of Chemical Abstracts since 1907, and a contributing editor of "Mineral Industry."

Dr. Fink lives in New York City, near Columbia University. He is married and has two sons. His recreations are music, gardening and teaching.

E. D. Frohman, vice-president and Pittsburgh district manager of The S. Obermayer Company, maker of foundry supplies and equipment, has been elected president of the Alumni Association of Rose Polytechnic Institute at Terre Haute, Ind.

Otto da Costa Schmidt, metallurgist, is now president of The National Bronze Powder Manufacturing Company, Elizabeth, N. J. The company's plant has a production capacity of over a million pounds of bronze powders annually, the announcement states, and a full staff of technicians has been assembled.

Herbert V. Mercready, for some years president and treasurer of The Mercready-Phelps Company, Plainfield, N. J., advertising agency, has sold his interest in that company to **W. Edward Wheaton, Jr.** and **Robert M. Shepherd,** who will continue the business under the same name and address. Mr. Mercready has established at Garwood, N. J., a new business, Herbert V. Mercready Advertising, which will handle the advertising for the concerns with which Mr. Mercready has been most intimately connected. In addition, Mr. Mercready continues in a consulting capacity on the staff of Mercready-Phelps, particularly for sales manual or portfolio work.

Standards Assn. To Take Over Some Govt. Work

The following activities of the National Bureau of Standards at Washington, D. C., are to be transferred to the American Standards Association, a federation of 37 national technical societies, trade associations, and governmental bodies, with headquarters at 29 West 39 Street, New York, as the result of an arrangement worked out between Secretary of Commerce Daniel C. Roper and President Howard Coonley of the Standards Association:

Division of Trade Standards.
Division of Specifications.
Division of Simplified Practice.
Building Code and Plumbing Code Sections of the Building and Housing Division.
Safety Code Section.

Obituaries

Robert H. Taylor

Robert H. Taylor, president of the Yerges Manufacturing Company, Fremont, Ohio, buff manufacturers, died June 26, 1933.

Mark E. Nickerson

Mark E. Nickerson, founder and head of the Nickerson Art Metal Company, 236 Aborn Street, Providence, R. I., died at his home at Pawtucket, R. I., on June 22, 1933, in his 65th year. He was ill only a few days with pneumonia. Mr. Marks was born in Pawtucket where he was prominent in political and public life as member of the City Council and school committee. He established the Nickerson company in 1913. He is survived by his widow, a daughter and two grandchildren. W. H. M.

Elijah W. Hodge

Elijah W. Hodge, founder of the Hodge Manufacturing Company, died June 4, 1933, at Greenville, Pa., aged 90. Mr. Hodge was born in England, and started his career in the woolen mills there. He emigrated in 1868, settling at Greenville, where he went to work for the Hamblin and Son Company, foundrymen, as a molder. Seven years later he set up a small brass foundry which in a short time became the Hodge Brass and Iron Foundry, and in 1883 the Hodge Manufacturing Company.

Industrial and Financial News

Aluminum Price-Fixing Inquiry Still On

On July 6, 1933, United States Attorney General Cummings at Washington, D. C., stated that charges of price-fixing on aluminum and steel rails were still being investigated by the Department of Justice's anti-trust division. The charges, which are against the Aluminum Company of America, he said were being "languidly" investigated when he came into office, and that he had given instructions to speed up the inquiry. He remarked that aluminum prices have remained static over a long period while other commodities had fluctuated violently. This he took as an indication of possible price fixing, and he added that since "the Aluminum Company has a most complete monopoly in the United States, it is manifest that they could do as they would as to American prices." He also said:

"Aluminum companies in other countries could import the product to this country and, if below the American price, would fix the domestic price, if it were unduly high.

"Some suggest that there is a very pleasant understanding between the American monopoly and what might be called a competitor."

Corporation Reports

Western Cartridge Company, East Alton, Ill., reports for 1932 net loss of $642,816, against net income of $11,722 for 1931.

New Incorporations

Regal Metal Products Company, 114 Fayette Street, Peoria, Ill.; $75,000; manufacture metal goods; by E. N. Woodruff and P. J. Gobberdiel.

Herrick Heating Equipment Company, Inc., Syracuse, N. Y.; $5,000 nominal; manufacture heating equipment; by C. J. Herrick, W. R. Smith and F. N. Decker.

A. P. William Bronze and Iron Company, Inc., 324 Madison Avenue, New York; $40,000; to conduct metal works; by Mordecai Kenowitz.

Ross Galvanizing Works, 395 Kent Avenue Brooklyn, N. Y.; $125,000; to take over the firm of same name, a maker of galvanized metal products, operating stamping, zincing and plating departments; by S. J. Kupfer and associates. Same interests have chartered Ross Roofing and Building Supply Corporation as an affiliated company.

Dominion Electrohome Industries, Ltd., Kitchener, Canada; $300,000; manufacture radios and household electrical equipment; company is a merger of Grimes Radio Corporation and Pollock-Welker, Ltd. Departments operated: tool, stamping, soldering, plating, polishing, lacquering and japanning. Officers include F. G. Gardiner, H. S. Parkinson, D. H. Rowan and C. L. Rason.

Metals Gain in Building

Increased use of metal in building construction, to supplant units previously made of masonry, is the current architectural trend, William M. Crane, Jr., of the Copper and Brass Research Association, said at the annual convention of the Ohio Sheet Metal Contractors' Association last month. This is due, he explained, to the fact that metal is lighter in weight than masonry, saves space when in place, and is insurance against disastrous leaks.

Canadian Metal Output

Nonferrous metal manufactures of Canada for 1932 were valued at $161,957,930, according to "Canada Week by Week." The industry has seven groups of products: aluminum; brass and copper; lead, tin and zinc; jewelry and silverware; electrical apparatus and supplies; miscellaneous metal products; nonferrous smelting and refining. Most plants are in Ontario and Quebec, which have 304 and 87 plants, respectively. British Columbia has 24. Canadian imports of nonferrous metals and products in 1932 were worth $21,642,924, 74% of which came from the United States. Canada's exports of such products amounted to $48,130,177, not including re-exports. The United States took $18,762,898 worth of these exports.

Brass Mills Raise Wages, Plan Code

The Connecticut valley brass mills last month increased wages from 7½ to 10 per cent.

These mills are also collaborating with the brass industry throughout the United States to determine a code of practice under the National Industrial Recovery Act.

Complete details are to be found in this issue under the Waterbury news on page 293.

Business Items---Verified

Metal Equipment Company, Jamestown, N. Y., has increased wages 10% and reduced working hours to 8 daily, permitting steady two-shift operation of all departments. About 400 men are affected; 160 were added to payroll the latter part of June.

Parker Rust Proof Company, Detroit, Mich., has been delivering over 12,000 barrels of bonderizing compound daily since June 15, for use on steel beer barrels, according to **C. H. Awkerman,** vice-president. He said that by July 15 the shipments would be 18,000 barrels daily.

Farrel-Birmingham Company, Inc., Ansonia, Conn., increased all hourly wage rates 10% on July 10, and instituted a schedule of five 8-hour days weekly wherever practicable, eliminating overtime as far as possible. The action is in voluntary co-operation with governmental efforts to improve conditions.

Toledo Scale Company, Toledo, Ohio, has established a new service department occupying 30,000 sq. ft., equipped for repair and servicing of any size or type of scale. A training school for field service employees is included. Company offers a booklet giving data of interest to scale users.

Seneca Brass and Plating Works, Utica, N. Y., has moved into new quarters at 204 Seneca Street, and is equipped for repair and refinishing of all types of metal products. Company operates brass machine shop, tinning, soldering, grinding, brazing, plating, polishing, lacquering and japanning departments. **Thomas L. Tulloch** is manager.

Maas and Waldstein Company, Newark, N. J., lacquer and enamel manufacturers, have appointed **C. L. Berry** western sales manager in charge of the offices and warehouse at Chicago, Ill. Mr. Berry has been with the company many years, and will provide prompt and efficient service in line with the company's established policies, it is stated.

Summit Foundry Company, Geneva, N. Y., in receivership since August, 1932, has been reorganized as **Summit Stoves, Inc.,** with $200,000 capital, by John Cannizzo, W. S. Kennedy and E. C. Staley.

Roxalin Flexible Lacquer Company, Long Island City, N. Y., announce the addition of **William H. Robinson** to their New England sales force. For the past fifteen years Mr. Robinson was associated in an engineering capacity with Spray Engineering Company of Somerville, Mass. His extensive experience was principally confined to New England, and will be of considerable value to Roxalin's New England customers.

National Cash Register Company, Dayton, Ohio, has adopted a standard working week of 40 hours with a minimum hourly rate of 35 cents for men and a $14 a week minimum for women.

Metal Developments

Aluminum. Beer barrels of aluminum are being adopted by some brewers, according to Aluminum Company of America, whose New Kensington, Pa., plant has produced a number. Their advantages are said to be great weight reduction, elimination of pitching painting and liners, high strength. The half-barrel (15½ gallon) size weighs 21 pounds. The metal has no effect on taste or color, it is stated.

Aluminum rail cars for high speed service are being tried out by a number of railroads. The Austro Daimler rail bus which was brought from Vienna to be shown at A Century of Progress can go 90 miles an hour. It is built of light alloys, largely.

Aluminum. The German companies have brought out alloys in the new magnalium series, as follows: "Hydronalium," by I. G. Farbenindustrie; "BS-Seewasser," by Vereinigte Leichtmetallwerke; and "Duranalium," by Durener Metallwerke. The new alloys contain 5 to 10 per cent magnesium, and are said to have high strength and corrosion resistance.

Aluminum. South Manchurian Railway Company, China, plans to put up a small experimental plant for aluminum production from clay deposits in Manchuria. Japanese interests plan regular production at Fushun, to supply Japanese consumers, if the experiments succeed, according to advices received by the Department of Commerce.

Platinum was being considered for currency in Russia, according to reports last month. It would provide a market for the metal, and expand purchasing power of the U. S. S. R., it was figured.

An old **silver** mace has been presented to **Columbia University.** It is a reproduction made in the 18th century of a mace which was made in the 17th century. It is beautifully wrought in Jacobean style.

Aluminum will be used for every piece of furniture for the new treaty cruiser, U. S. S. New Orleans, launched at New York recently. Practically all fittings will also be made of the light alloys, and aluminum foil is being used for bulkhead insulation, according to the press.

A rare church bell cast by Paul Revere was sold at New York in January for $1,300. The bell is 37 inches high and 45 inches in diameter. It bears an inscription in relief showing Paul Revere's name.

Nickel. Japan will use 100% nickel for all small coinage, instead of 20% nickel, 80% copper now used, it is reported from Tokio. Intention is to build up huge reserve of nickel ready for munitions.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

AUGUST 1, 1933

Wage increases in the three large brass concerns, averaging from 5% to 10% were announced last month. It is estimated that the increases will mean about $20,000 more paid weekly to about 10,000 employees. **The American Brass Company** has made a straight 7½% increase in all hourly or piecework bases. Salaries and weekly wage bases will not be changed for the time being.

Scovill employees on hourly bases have been raised 2.6 cents an hour. To the earnings of all piece workers there has been added 2.6 cents for every hour of work they perform.

The Chase Companies, Inc., has raised the normal hiring rate for mill labor at the Chase Metal Works and Chase Rolling Mill to 35 cents an hour, and has made proportionate advances in other hourly rates, ranging, according to the class of work performed, from 5% to 10%, and the average is 7½%, according to **Rodney Chase,** assistant secretary. Chase also increased weekly wages an average of 7½% at the Waterbury Manufacturing Company plant and the Grand Street offices.

Officials of the plants said the increases anticipate the adoption of a code calling for minimum wages for the industry. Several also stated that when the code is adopted it is probable that further increases will be made in the pay of those above the lowest paid class.

According to local brass company officials the minimum wage to be called for in the code will not affect many in the city as it will apply only to the lowest paid employees, and the bulk of the employees of the local concerns are skilled workmen and above that rate of pay. Consequently, when the minimum wage is adopted it is probable that those above that class will receive increases to keep their pay proportionately above those in the lowest paid group.

Representatives of the three concerns mentioned are serving on a national committee which is meeting in New York to draw up a code for the industry. **Rodney Chase,** assistant secretary of the Chase Companies believes the code is practically ready now, and should be submitted within a week or two, although it may be longer before it is announced. **Clifford F. Hollister,** vice-president, secretary and treasurer of American Brass, believes the code will be ready within a week or 10 days. There has been difficulty in getting concerns in various parts of the country to agree on a minimum wage because of varying living conditions in the different sections. It is understood that one thing that has been holding up the code is that the industry is waiting to see what the codes for the major industries are like. Until codes for all the major industries are submitted and approved, even though the brass code is ready, it probably will not be announced.

It was stated here last month that wages in local brass plants have not been reduced as much as they have in brass plants elsewhere. In few cases has it been more than 20%. Many employees are receiving pay which is more than 20% under normal, because they are working fewer hours or on less important jobs.

James W. Furness, chief of the Commerce Department's brass division, said last month that a code supposed to include the brass people was filed by the copper people, but it was found unsatisfactory, and the brass people are now working on a code for themselves alone. The copper code was rejected, he said, because there were too many different types of industry involved in it and because the administration felt that the copper people wanted to blanket too many types of labor under one code. Such a separate code for the brass industry has not been presented yet, he said.

R. W. Reid represented Beardsley and Wolcott Manufacturing Company on the national committee to draft a code for the electrical equipment business. It is expected that minimum wages for New England will be slightly higher than for the rest of the country.

The Chamber of Commerce here reports an increase in employment in the city during June over May of 1,792 persons. Among the eight largest factories the increase was 1,520. Electric consumption during June increased 2,032,413 kilowatt hours over the previous month. Bank clearings rose $486,700 over May. The number of persons being given work or relief by the Mutual Aid has dropped from 2,400 during the winter to about 1,200 now. There has been such a decline in the number needing help that the receipts of the fund have been much higher than the expenditures for two months now, with the result that those contributing to the fund, which includes practically all who are employed, will be allowed to cut their contributions in half beginning September 1.

Chase Companies, Inc., is now operating at better than 50% of capacity, according to report, and is absorbing practically all the present output of the domestic mines of the Kennecott Copper Corporation, which is reported to be operating at 16% in this country and 30% abroad, and showing a profit. The Chase Companies at capacity production can fabricate into products 300,000,000 pounds of copper a year. This would use 40% of the entire capacity

output of the domestic mines of Kennecott. The Waterbury plant carries its product nearer to the finished form than do most fabricating plants, and as a result shows more profit.

A reorganization of the **Beardsley and Wolcott Manufacturing Company,** now in receivership, is being planned.

John V. Montague, assistant treasurer and controller of the **Scovill Manufacturing Company,** addressed several joint meetings of the Hartford chapter of the National Association of Cost Accountants and the Manufacturers Association of the state held in various parts of the state last month to discuss the changes that will be required in cost accounting as a result of the National Recovery Act. Representatives of all the local factories attended the meetings.—W. R. B.

Connecticut Notes

AUGUST 1, 1933

BRIDGEPORT.—The Bridgeport Brass Company announced a wage increase of 10% for its 1,800 employees, effective July 17. Since March the working force has been built up from 600. The company is said to be operating at about 75% of normal capacity.

The Bridgeport Manufacturers Association reports 9,764 employees in the 30 largest plants. Average working hours for the week ending July 1 were 37.9. Aggregate hours were 377,812, compared with 368,035 for the week of April 16, 1932. The week of July 1 was the first since then showing an increase over the corresponding week of the previous year.

The Remington Arms Company employees, numbering about 1,900, have been notified of a 10% wage increase, and adoption of the 40-hour week.

Donald F. Carpenter of Wilmington, Del., has been appointed director in charge of manufacturing, research and development activities of the **Remington Arms Company,** with headquarters in this city, according to an announcement by **C. K. Davis,** president and general manager. The company is moving its sales administration department from Wilmington to Bridgeport, with **E. E. Handy,** vice-president, in charge.

American Chain Company has taken over the drawing, fabricating and sale of Allegheny metal and alloy wire.

Wheeler Insulated Wire Company has established a minimum wage of 35 cents an hour for its 230 employees.

American Tube and Stamping plant, owned by the **Stanley Works,** is reported much busier, and has started another of its blast furnaces.

Anderson Die Machine Company, closed for several months, has reopened with a working force of about 50.

Bryant Electric Company has increased its working hours by 8 hours a week.

NEW BRITAIN.—The Stanley Works announced the retirement of **Col. Arthur F. Hatch** as vice-president and general manager in charge of the branch factory at Hamilton, Ont. **John C. Cairns** of this city has been named as his successor in both capacities.

"Stanlo," the construction toy, being manufactured by Stanley has required 100 new employees. Production started June 16. The toy is on sale and display at the Chicago exposition, and is being ordered by department stores all over the country. The company is hiring back its old employees before taking on new help.

The Stanley Rule and Level division is now operating on a 40 hour week schedule, and has added to the number of its employees. Many of the other departments are on a 55 hour week. About 200 former employees have been put back to work in the last two months.

BRISTOL.—Bristol Brass Corporation has added to its working force the past month so that it now has about 500 hands. The working hours have been increased about 20%. Business the last three months showed more than a 100% gain over the first three months of the year.

New Departure Manufacturing Company has added 300 employees the past month, and now employs in this city about 2,100. The management is spreading the work to keep employment at 40 hours weekly. During the last week of last month schedules called for 49.8 hours, due to special requirements. Reports that workmen were being brought in from out of town were denied by high officials of New Departure, E. Ingraham Company, J. H. Sessions and Sons, Veeder-Root, and Wallace Barnes Company.

HARTFORD.—Walter H. Penfield. vice-president and controller of the **Colt's Patent Firearms Company,** died at New Haven Hospital June 28, after a heart attack. He was 60 years old. He was born in Portland, Conn., first worked as a bookkeeper for the Schailer and Hall Quarry Company, and came to Colt in 1901. He became assistant treasurer in 1909, treasurer in 1911, vice-president and treasurer in 1919. He was a prominent Mason, a past potentate of Sphinx shrine of this city. He leaves a son, Richard P. Penfield, a daughter, Mrs. Warren A. Heidel of Meriden, and several grandchildren.

Arrow, Hart and Hegeman reports increases in the number of employees and in working schedule.

Underwood, Elliott, Fisher Company has increased operations approximately 25% at its local factory. It has transferred from Harrisburg, Penn., to Bridgeport certain departments of its large bookkeeping machine business.

MERIDEN.—New Departure Manufacturing Company has added about 100 employees to its local plant, due to increased production in its automatic machine department, and has put on a night shift.

Bradley and Hubbard Manufacturing Company is manufacturing a new line of stove oil burners in three grades.

ANSONIA.—American Brass here has announced a wage increase amounting to about 7½%.

Farrel-Birmingham Company has increased the hourly wage rate of all employees 10%, and adopted the 40-hour week. The company normally employs about 1,000, but this was greatly reduced during the depression. While many men have been put on recently, the total is still below normal.

TORRINGTON.—Union Hardware Company shut down for two weeks around July 4, and some employees were given a three weeks' payless vacation. **Torrington Company** shut down for one week.

Union Hardware Company has acquired 12,000 shares of its own preferred stock, par $100.

WINSTED.—The William L. Gilbert Clock Company has increased wages 10% affecting about 375 persons. The employees have received several cuts during the last few years, one alone amounting to 33 1/3%. It has been announced that a group of local business men have purchased enough of the company's stock from the National Rockland Bank of Boston so that it will be controlled locally, and the plant kept in Winsted. It went into receivership several months ago. One of the receivers, **Norman L. Thompson, Jr.,** former president of the company, died recently, following which it was found that a majority of the stock had been pledged to the Boston bank as collateral for a loan. Outside interests were attempting to secure this stock with the intention of transferring the business elsewhere. The local people securing a controlling interest are: Ralph E. Thompson, O. G. Williams, Margaret Thompson, John J. McClellan, Robert Leighton and Judge H. H. Howd. These men with Mrs. O. G. Williams, William H. Phelps and Edward B. Gaylord form the board of directors. Business is improving and it is expected the receivership will be ended soon.

COLLINSVILLE.—Collins Company stockholders last month reelected directors who in turn reelected the officers. The regular quarterly dividend of 50 cents a share, payable July 15, was declared.

MILFORD.—J. Edward Peterson of Waterbury, president of the **Waterbury Lock Specialty Company,** has bought the factory formerly operated by the **Edwin A. Reeves Manufacturing Company,** and will begin manufacture of light metal specialties. A force of about 60 men and 25 girls will be employed.—W. R. B.

Providence, R. I.

AUGUST 1, 1933

Reflecting directly the continued decline in the activity of private business and public utility corporations during 1932, corporation tax revenues to the State slumped sharply for the third successive year, and will bring $208,653 less into the treasury than in 1931. Although a few industrial corporations which showed amazing activity during the third tax year of the depression, the larger portion of the list fell off

markedly, the amount of corporate excess on which the 1932 tax is based being $173,547,103.58 as against $215,553,884.23 for 1931.

Brown & Sharpe Manufacturing Company, which once paid taxes on corporate excess of over $5,000,000, showed no corporate excess for 1932. It pays a franchise tax of $2,000. **Nicholson File Company,** while still holding its place as the third largest taxpayer with a corporate excess base of $3,761,992, shows a much lower corporate excess than previously.

Vincent Sorrentino, president of **Uncas Manufacturing Company,** jewelry manufacturer, has purchased controlling interest in **Beacon Manufacturing Company,** 86 Page Street, manufacturer of drawing and mechanical instruments. Beacon's machinery and apparatus has been moved to the Uncas plant, 623 Atwells Avenue, where manufacture of Beacon products will continue.

Acme Tank and Welding Works has been incorporated to manufacture metal products; 100 shares, no par value; incorporators: **W. J. G. Lawton** and **J. M. and M. E. Connelly.**

Forest E. Dean has been elected president and treasurer of **Calvin Dean, Inc.,** jewelry findings, to succeed his father, the late Calvin Dean. Mrs. Calvin Dean is vice-president, and **Velna L. Twitchell** secretary and assistant treasurer.

Imperial Armour Rex Company, manufacturing jewelers, 14 Blount Street, is erecting a storage building addition to its plant, two stories, 22 by 34 feet.

Langelier Manufacturing Company, Cranston, R. I., has filed capital stock reduction from $100,000 to $1,000.

Providence Metal Specialties Company, 77 Washington Street, is conducted by **Herbert S. Marks** and **G. Leon Silverman.**

American Emery Wheel Works plant on Pitman Street has been undergoing extensive alterations. Company is preparing for capacity business this fall.

Reynolds Company, 107 Friendship Street, is owned by **White Manufacturing Company, Inc.; George A. Pastore,** treasurer.

Between 150 and 200 employees at **Providence Base Works,** local branch of **General Electric Company,** were affected by the 5% wage increase which became effective July 1st.

Final report of **Elisha C. Mowry** as receiver for **Alfred Vester Sons, Inc.,** has been allowed by Superior Court, and a decree has been entered dissolving the respondent corporation.

W. H. M.

Middle Atlantic States

Newark, New Jersey

AUGUST 1, 1933

Some metal plants here are enjoying increased business, while the jewelry manufacturing business closed down for the first two weeks in July, an annual practice to allow for vacations and inventory. When the plants reopened many of the hands were taken back, but others were informed that they may be called later.

Art Metal Works has increased its staff of workers about 7% in the past month. The concern reports it is behind in fulfilling orders, with more orders on hand than is usual at this time of the year.

Business in piping and fixtures for bars has resulted in more work at some plants.

Newark Lamp Works has added about 15% to the number of its employees, and increased the hourly pay rate 5% since June 1.

Ingoe Brothers, 234 Poinier Street, has let a contract for an addition to the wire mill, 40 by 140 feet.

National Bronze Powder Manufacturing Company, Elizabeth, N. J., has leased 13,000 square feet of floor space in the old bronze powder factory on Magnolia Avenue. New machinery is now being installed. **Otto A. Schmidt** of Sharon, Pa., is president of the company. He was formerly employed by bronze powder factories in Youngstown, O. He recently obtained a patent for the manufacture of bronze powder. The plant will have a capacity of 10,000 pounds a month.

C. A. L.

Trenton, New Jersey

AUGUST 1, 1933

Trenton metal plants report that business shows some improvement, with an increase of orders.

John A. Roebling's Sons Company announced a boost in wages for all employees. All day employees have been given an increase of 3 cents an hour. Since the depression the men were cut 25%; 10% of this has now been returned. On July 1 all salaried employees were notified they would not have to take a forced vacation, meaning the return of a total of 11½% to pay envelopes.

Trenton Brass and Machine Company has let a contract for an addition to the foundry and machine shop to cost $7,000. **Roebling's** and the **Crescent Insulated Wire and Cable Company** have shipped several hundred tons of material to the Pacific Coast.

New Jersey Incorporations

Continental Products Co., Inc., Newark; manufacture metal goods; $15,000.

Tepp & Hoffman, Newark; manufacture jewelry; 10 shares no par.

Du Sales, Inc., Jersey City; manufacture cutlery; $25,000.

Koenig & Schoner, Inc., Irvington; manufacture metal products; 100 shares no par.

New Jersey Type Founders, Cranford; printing type; 1,000 shares no par.

H. & S. Engineering & Foundry Corp., Newark; 5,000 shares.

National Bronze Powder Mfg. Co., Jersey City; bronze and aluminum products; 2,500 shares.

Phoenix Mining Corp., Elizabeth; 2,500 shares.

Lamp Associates, Inc., Newark; manufacture lamps; 1,000 shares.

C. A. L.

Central New York

AUGUST 1, 1933

Conditions in Central New York continued to improve during the past month. The New York Central reported 2,038 cars loaded and unloaded at Utica in June, compared with 1,201 cars for June 1932.

Employment in the metal trades for Utica in June was improved over the preceding month, while hours worked for June were 66.2% of normal compared with 59.8% for May.

Bossert Corporation has begun manufacture of a rustless metal beer keg. It was expected that the making of this keg, which requires a rustproofing process, would stimulate business for the corporation. Gilbert Butler, treasurer, said many brewers have tried metal kegs and prefer them to the wooden type.

A. O. Foster of **Foster Brothers Manufacturing Company,** was elected chairman of the Metal Bed and Bed Springs Association, to direct the working out of a business code under the Industrial Recovery Act. His appointment took place in Chicago.

Air conditioning for private homes will serve as the vehicle which will pull the sheet metal, roofing and heating contractors out of the depression, **Thomas Richardson,** president of **Richardson and Boynton,** told the Oneida-Herkimer Association of sheet metal men at a conference in Utica.

The Chamber of Commerce of Rome, N. Y., announced a survey of retail business shows an increase of 20% since March, and that the bulk of this was due to the increased employment in the copper mills of the city.

Doland F. Carpenter has been appointed director in charge of manufacturing, research and development activities of the **Remington Arms, Inc.,** at Ilion. Mr. Carpenter was formerly general manager of the Pyralin products department of the Du Pont Viscoloid Company. The appointment became effective July 24.

Charles K. Davis, president of Remington Arms announced a workers' council will be organized at the plant in which the workmen will be given a voice in plant policies. The council will consist of 14 men, seven to be chosen by the workmen, and the remainder by the management. All monthly salaried employees of Remington Arms were told they would receive a 10% increase in pay before mid-July.

E. K. B.

Middle Western States

Detroit, Michigan

AUGUST 1, 1933

Business has shown a decided improvement all through the industrial area along the Great Lakes. It is particularly in evidence, however, in the production of refrigeration units, vacuum cleaners, motor cars, motor accessories and plating. This does not mean a boom, but it does mean a decided betterment compared with six months ago. Detroit is still suffering from the bank crashes of last spring, and much progress that otherwise would have been made is now being held up.

The most pronounced activity is in the motor car plants, where production is greater than it has been in two years or more. This, of course, is a relief to various lines closely allied to the motor car. The plating industry is being carried along to better things. The same is true in the accessory plants located in communities throughout this part of the country.

Production of motor cars, however, is restricted. No stocking is in progress. Orders must be in sight before cars are made. This is a program that will continue throughout the year. When the public is supplied for the season, production will taper off. The same procedure prevails in the refrigeration industry, but demand has been more constant and dates back through last winter.

The iron and aluminum plants show more than usual activity due, of course, to demands from the automobile industry.

Not much is in sight that is favorable to production of plumbers' and steam fitters' supplies. Also, there is almost no activity in manufacture of jewelry, which is practically at a standstill.

Announcement is made that the June volume of business of **Bohn Aluminum and Brass Corporation** was the largest for any one month during the last four years. The volume, it is further stated, is being maintained for July, and present schedules indicate that the past month's business will equal that of June.

The company's inventory has appreciated in value more than 40% since the end of 1932, when approximately 45,000,000 pounds of metal was carried, estimated roughly at $3,000,000.

Daily shipments by **Mueller Brass Company,** Port Huron, Mich., are equalling those of the boom period in 1928, it is stated. More than 800 persons are on the payroll, compared with 275 in January. They are working 45 hours a week, with some departments active 24 hours a day. This concern is busy on automobile and refrigeration supplies and copper pipe and fittings.

Fred Wardell, president of **Eureka Vacuum Cleaner Company,** announces that for the first six months of the year his plant showed a gain of approximately 40% over the same period for 1932.

Final figures indicate that **Kelvinator Company** in the quarter ending June 30, shipped 110,989 refrigerators, compared with 64,052 in the corresponding period of 1932. June shipments were more than double those of June last year. The record of sales volume during June was without precedent in the electric refrigeration industry, it is stated.

Leonard Refrigerator Company also is having a heavy run of business. June was the best month the organization ever had. Shipments registered 75% ahead of the same month a year ago. Unfilled orders on hand for July are reported more than five and a half times those of the same date a year ago. With prospects bright for continued record buying through August, the company has inaugurated the most extensive summer advertising campaign in its history.

F. J. H.

Cleveland, Ohio

AUGUST 1, 1933

Business conditions in this district follow the trend prevailing in other Great Lakes areas. Manufacturing is improving, and much confidence is expressed concerning the future. Industry probably would be considerably more active if it were not for handicaps due to last spring's banking upheaval. This, however, is gradually being cleared up.

Motor industry probably is most active. Accessory plants are in good production, with orders ahead promising good activities for a considerable time. Plating plants also are more busy.

While there is a much better tone in business, there is no denying the fact that caution is general, and no one is contracting for more than he is going to turnover promptly. No one is anticipating a general boom

Fisher Body Company's plant here is now employing upwards of 4,500 men. Approximately 24,000 automobile bodies are being turned out weekly, it is stated.

A 10% wage increase affecting 225 employees was announced on July 12 by **Humphreys Manufacturing Company,** Mansfield, manufacturer of bathroom fixtures and supplies. This increase represents a substantial restoration of former cuts.

Factory payrolls of **Eaton Manufacturing Company,** Cleveland, showed an expansion of nearly 200% in June over March, and of 35% over June, 1932. This company manufactures a large variety of automobile parts, and has plants in Cleveland and Massillon, O., as well as in a number of Michigan cities.

Frigidaire Corporation, Dayton, O., announces it is now operating at peak schedule, with 10,000 persons employed. This is a subsidiary of General Motors.

F. J. H.

Chicago, Illinois

AUGUST 1, 1933

Metal trades are now coming in for their share, as most industries did a July business greatly in excess of that of July, 1932, although not equalling in many instances the same month in 1931.

Even before presentation of the administration's blanket industrial code, Illinois manufacturers in large number began to increase wages and size of payrolls. As early as the middle of June **Mathiessen and Hegeler Zinc Company,** among others, increased wages 20%. Recently the **Williams Oil-O-Matic Company,** operating at Bloomington, established factory employment on a 40-hour week and increased wages 35%. **Oliver Farm Equipment Company** was one of the first large companies to declare its support of the code.

Machinery organizations throughout the country at a recent meeting here formed a federation which will rank among the five largest trade bodies in the United States. Known as the Machinery and Allied Products Institute, it represents a working force of about 350,000, and a cash investment and yearly sales of approximately three and one-half billion dollars. Included are practically all American machinery builders except those already allied with the Iron and Steel Institute and with railway equipment, automobile, steamship and electric manufacturing bodies. **John W. O'Leary** heads the organization.

C. B. Smith has resigned as president and executive committee member of **Stewart-Warner Corporation.** Early in May, **W. J. Zucker** retired as vice-president, general sales manager, secretary and director.

S. R. Dresser Manufacturing Company has purchased **Bryant Heater and Manufacturing Company. F. A. Miller** and **H. N. Mallon,** formerly chairman and president, respectively, of Dresser, will act in these capacities in the new organization. **L. C. Harvey,** formerly sales manager of the heater company, is now vice-president in charge of sales. **E. P. Bailey, Jr.,** who severed his connection with Bryant three years ago, has returned to become vice-president in charge of operations.

National Pressure Cooker Company will spend $35,000 in factory enlargements at its plant in Eau Claire, Wis.

Electric Metal Makers' Guild, a national association open to anyone engaged in making metals in electric melting furnaces, was formed recently in Chicago. Officers are H. B. Schulz, Illinois Steel Company, president; A. E. Kayes, **International Nickel Company,** vice-president; and Joseph A. Scott, **Driver-Harris Company,** secretary-treasurer.

Allis-Chalmers Manufacturing Company announces production of a new tractor capable of plowing five miles per hour. Equipped with air tires, it can be used to truck produce into town at

road speed of more than 35 miles per hour.

Three new six-cylinder trucks are being introduced by the **Federal Motor Truck Company.**

Albert R. Erskine, late head of **Studebaker Corporation,** South Bend, Ind., left an estate of only $100,000.

A. B. Dick Company, makers of mimeographs, has commissioned **Walter Dorwin Teague** of New York City to redesign its products.

June sales of the **Frost Company,** Kenosha, Wis., plumbers' brass goods, exceeded those of May by a large margin. **Chicago Hardware Foundry Company,** and **Wrought Washer Manufacturing Company** also showed increased June sales.

Nash Motors declared a 25 per cent dividend on July 7.

Charles Deere Wiman, Moline, president of the **National Association of Farm Implement Manufacturers,** called a meeting of the directors to draft a code under the National Recovery Act.

Among the new incorporations are the following:

Continental Brass Manufacturing Company, Waukegan Terminal Building, Waukegan, Ill., manufacturers of brass and bronze products.

Monex Chicago, Inc., 55 East Washington, manufacturers of Monex change maker machines.

American Sweeper Company, 158 East Grand Avenue; $30,000 preferred and $20,000 common; metal and mechanical products. R. G. K.

Pacific States

Los Angeles, Calif.

AUGUST 1, 1933

U. S. Electric Manufacturing Company here is actively promoting sales of the "Varidrive" motor.

Hollywood Portable Electric Welding Works is a new firm at 6310 Santa Monica Boulevard, Los Angeles. **Walter Wilham** is owner.

Weldcraft Service and Supply Company has moved to 2440 East 14th Street, Los Angeles. **C. J. Norquist** is owner.

A new concern will be started in Los Angeles to market machinery which forms and welds steel plates into pipe, invented by **Carl Carlson** of Green Bay, Wis.

Consolidated Aircraft Corporation of Buffalo, N. Y., has acquired 30 acres at the Long Beach airport, and will build a large factory to build planes. Plant will cost $250,000, and will use a large amount of metal. **R. H. Fleet** is general manager.

Advance Welding Works has moved to 749 East 15th Street, Los Angeles. **Owen Temple** is owner.

Jacks Welding Shop has moved to Florence Avenue and Hooper Street, Los Angeles. **J. A. Stoddard** is owner.

Roy E. Poehler and **William E. Biles** have established the **Metal Letter Craft** at 1312 South Hobart Boulevard, Los Angeles, to manufacture badges, emblems, school pins, medals, name plates, signs and do die work.

Northrup Aircraft Corporation at Los Angeles Airport has completed 15 all-metal ships for Transcontinental and Western Airways. The ships are designed to make express trips between Pacific to Atlantic coasts in about 15½ hours of flying time, averaging 175 to 200 m.p.h. The planes are new in design, having the novel "Zap" flap hinge on the wings, which acts as a brake in the air and reduces landing speed to 50 m.p.h. Some 1000 man hours of highly skilled labor is required to build each of these low-wing monoplanes. Duralumin is used, largely.

A. R. Maas Chemical Company, South Gate, Los Angeles, has enlarged its plant by 4,000 sq. ft. of manufacturing floor space, and a new warehouse.

Lloyd S. Read, 124 West 4th Street, is interested in a new humidifying device attachable to any electric fan and known as the "Kul Air."

Butts Manufacturing Company, 722 Ceres Avenue, is manufacturing a new line of bridge trays and nursery clothes dryers, all of metal.

H. A. Swenson Company, 10625 Budlong Avenue, is putting out a new line of door catches.

Other West Coast News

Ellinor Brass and Valve Company, Perry Street, San Francisco, is making a new line of beer faucets, taps, pipes, fittings, couplings and attachments, using brass, nickel, and chrome and silver plate. Faucets are all lined with block tin.

Williams - Wallace Company, San Francisco, manufacturer of sheet metal products, is making thousands of dummy bombs for army airplane practice. They are made of sheet metal, designed by **W. A. Wallace.** The company is also making aluminum products, refrigerator cabinets and Thyraton spot and line welding equipment.

Forster Manufacturing Company, Berkeley, Calif., is actively manufacturing industrial gas furnaces, ovens, enameling equipment and also heating and melting apparatus.

W. A. Lortz, representing **Dr. M. N. Schoop** of San Francisco, has developed and is now manufacturing metal spraying equipment.

Hubbard and Company, Emeryville, Calif., maker of automatic gas fuel equipment, has recently improved its large plant. H. S.

Metal Market Review

JULY 27, 1933

Practically all the nonferrous metals went higher in price during the past month. Those which did not, were strong in tone, and at some time during the month moved up above the levels obtaining at July 1. The matter of arranging codes of practice for the various components of the metal producing industries is now one of the chief topics, and from all appearances the differences have largely been ironed out and codes will be presented shortly.

Copper.—Electrolytic copper began the month at 8.37½c. and climbed steadily until it was selling at 9c. at the end, although in the final week some shading occurred. There was active demand the first week, less the second, and fair business the last two weeks. Fabricators have been booking business steadily, which means copper consumption.

The committee formulating a code of practice for the copper industry has nearly completed its work, though not yet to the satisfaction of all concerned. It calls for 20% production throughout the industry, including custom smelters, until the huge surplus is materially reduced; a 40-hour week; increased wages; disposal of metal on a quota basis at a price that will give an operating profit to the industry. It is believed the figure, thus far kept secret, will be well above the current 9c. level.

Lead.—Lead began the month at 4.05c., and moved steadily upward until at the end of the month it was 4.35c. E. St. Louis. Sales for July shipment were reported in the industry at 42,500 tons, an impressive total. Battery makers as well as other consumers have been active buyers.

Zinc.—Zinc went from 4.50c. E. St. Louis, at the beginning of July to 5c. at the month-end. Stocks were reduced in June by more than 12,000 tons. The foreign producers are working on a new agreement which limits production by the European producers. The expiring agreement kept the output at 45% of capacity, and the new Cartel arrangement is expected to continue this rate.

Tin.—Tin was one of the exceptions to the rule last month, its price rising steadily the early part of July and receding somewhat in the last week. Straits tin was at 45.62½c. on July 20, after having been as high as 48c. July 7, and 47.75c. July 18. World production in June was reported as 6,611 long tons, a decline 800 tons from May.

Other Metals

Aluminum.—There was no change in the basic price of 23.30c. per pound for Alcoa commercial and mill ingot of 99.98% purity, or in any of the other grades quoted by the major producer.

Antimony.—The price went up steadily throughout July, in line with other commodities, and on July 27 was quoted 7.50c. to 7.60c. duty paid, for spot Chines or American.

Bismuth.—On July 11 the price was advanced 10c. to $1 a pound; on July

17 another advance of 5c. put the price up to $1.05.

Quicksilver.—The price has been advancing slowly but steadily, and on July 27 spot delivery was quoted at $64 and upward per flask. A price of $68 was reported July 20.

Precious Metals.—Silver prices climbed up steadily until the New York official level on July 18 reached 40.37½c. Then it receded somewhat, and on July 26 stood at 36.75c., having dropped sharply with the recession in security values.

Platinum was higher the latter half of the month, touching $33 an ounce on July 13, and remaining steady thereafter up to this date.

Scrap Metals.—Prices on various scrap metals went up in consonance with the primary markets in July, but eased off toward the end of the month as securities and commodities receded sharply.

Brass Ingot Statistics

On July 1, unfilled orders for brass and bronze ingots and billets on the books of the members of the Non-Ferous Ingot Metal Institute, Chicago, Ill., amounted to a total of 16,568 net tons, as compared with 16,712 tons June 1.

The combined deliveries of brass and bronze ingots and billets by the members of the Institute for June amounted to 4,973 tons, as compared with 3,804 tons in May.

Average prices per pound received by the Institute members on commercial grades of six principal mixtures of ingot brass during the twenty-eight day period ending July 14, 1933, are as follows, with comparative prices, reported for the period ended June 16:

	28 Days Ended	
Commercial 80-10-10	July 14	June 16
(% Impurities) ...	9.249c	8.917c
Commercial 78%	7.535c	6.552c
Commercial 81%	7.975c	6.997c
Commercial 83%	7.990c	7.207c
Commercial 85-5-5-5	8.364c	7.684c
Com. No. 1 yellow .	6.667c	6.217c

The Wrought Metal Market

July 27, 1933

The wrought metal markets have been considerably strengthened by the developments which have given so much encouragement to general business. Semi-fabricated and finished products have advanced in price, not only because of higher raw material prices but also on the basis of increased demand. The brass and other metal fabricating industries have quickly fallen into line with the government's efforts through the NRA to raise wages and increase employment. In the latter regard, the Waterbury news in this issue (page 290) tells what has been done by the Connecticut Valley mills, where the leading fabricators have advanced wages some 7½ to 10 per cent.

On July 7 the prices of wrought and fabricated brass and copper products, including all rolled, drawn and extruded shapes of copper, brass, bronze and nickel silver were advanced ½c. a pound, in line with the rise in copper to 9c. Copper wire base prices were advanced ¼c. the same day. On July 13 the prices of zinc products, including sheet, strip, plates, etc., went up ¼c. Anodes and other nonferrous products used in metal fabrication and finishing went higher also.

As for prospects, the most encouraging news is from the automobile industry, which has picked up so well the past few months. Along with this is the production of accessories, which require a great deal of metal of all kinds. Electrical production is better. The refrigeration industry has shown a tremendous gain. As indicated by the news from our correspondents in this issue, the general tone of business is better in most parts of the country. In the Great Lakes industrial centers even the plating industry, so long utterly depressed, has staged something of a come-back, while metal fabricators there are now in a much better position than a few months back.

From a financial viewpoint, metal fabricating companies have shown some real improvement. Federal Mogul Corporation showed a net profit for the first half of this, as against a loss for the same 1932 period; Savage Arms Corporation reports from the second quarter of 1933 a loss of $61,000, as against twice that amount of loss in the first quarter; Bohn Aluminum reported a big gain in orders.

Daily Metal Prices for July, 1933

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	3	4	5	6	7	10	11	12	13	14	17	18
Copper c/lb. Duty 4c/lb.												
Lake (Del. Conn.)	8.375		8.625	8.625	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic (Conn.)	8.25		8.50	8.50	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	8.00		8.25	8.25	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	4.50		4.60	4.60	4.75	4.85	4.85	4.85	4.85	4.95	5.00	5.00
Brass Special	4.55		4.65	4.65	4.80	4.90	4.90	4.90	4.90	5.00	5.05	5.05
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	46.25		46.50	46.50	48.00	47.00	46.00	47.25	46.70	46.625	46.70	47.75
Pig 99%	44.00		44.50	44.50	46.00	45.00	44.25	45.50	45.00	45.00	45.125	46.25
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb.	4.05		4.15	4.15	4.25	4.35	4.35	4.35	4.35	4.35	4.35	4.35
Aluminum c/lb. Duty 4c/lb.	23.30		23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9%	35		35	35	35	35	35	35	35	35	35	35
Shot (from remelted electrolytic)	36		36	36	36	36	36	36	36	36	36	36
Pellets 99.5-100%	40		40	40	40	40	40	40	40	40	40	40
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	6.50		6.50	6.50	6.50	6.75	6.75	6.90	7.50	7.50	7.50	7.50
Silver c/oz. Troy Duty Free	36.75		36.75	36.375	36.75	37.25	37.875	38.25	40.125	39.50	39.875	40.375
Platinum $/oz. Troy Duty Free	30.00		31.00	31.00	31.00	31.00	31.00	31.00	33.00	33.00	33.00	33.00

HOLIDAY

	19	20	21	24	25	26	27	28	31	High	Low	Aver.
Copper c/lb. Duty 4c/lb.												
Lake (Del. Conn.)	9.25	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.25	8.375	9.044
Electrolytic (Conn.)	9.125	9.00	9.00	9.00	8.75	8.75	8.75	8.75	8.75	9.125	8.25	8.856
Casting (f.o.b ref.)	8.875	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.75	8.875	8.00	8.669
Zinc (f.o.b. East St. L.) c/lb. Duty 1¼c/lb.												
Prime Western	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	4.50	4.89
Brass Special	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	5.05	4.55	4.94
Tin (f.o.b. N.Y.) c/lb. Duty Free												
Straits	47.25	46.00	46.00	45.875	46.375	45.75	45.25	45.125	44.625	48.00	44.625	46.376
Pig 99%	45.75	44.50	44.50	44.25	45.00	44.375	43.875	43.875	43.375	46.25	43.375	44.731
Lead (f.o.b. St. L.) c/lb. Duty 2½c/lb	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.35	4.05	4.31
Aluminum c/lb. Duty 4c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30
Nickel c/lb. Duty 3c/lb.												
Electrolytic 99.9%	35	35	35	35	35	35	35	35	35	35	35	35
Shot (from remelted electrolytic)	36	36	36	36	36	36	36	36	36	36	36	36
Pellets 99.5-100%	40	40	40	40	40	40	40	40	40	40	40	40
Antimony (Ch. 99%) c/lb. Duty 2c/lb.	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	7.50	6.50	7.195
Silver c/oz. Troy Duty Free	40.125	38.75	37.50	37.375	37.50	36.75	37.125	36.125	35.625	40.375	35.625	37.838
Platinum $/oz. Troy Duty Free	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	30.00	32.25

Metal Prices, August 1, 1933

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125. Electrolytic, 8.75. Casting, 7.25.
Zinc: Prime Western, 5.00. Brass Special, 5.05.
Tin: Straits, 44.625. Pig, 99%, 43.375.
Lead: 4.35. Aluminum, 23.30. Antimony, 7.50.
Nickel: Ingot, 35. Shot, 36. Elec., 35. Pellets, 40.
Quicksilver: Flask, 75 lbs., $65. **Bismuth,** $1.05.
Cadmium, 55. **Silver,** Troy oz., official price, N. Y., Aug. 1, 35.625.
Gold: oz., Troy, $20.67. **Platinuum,** oz., Troy, $33 to $34.50.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	Duty	U. S. Import Tax*
Brass Ingots, Yellow	7¼ to 8½	None	4c. lb.[1]
Brass Ingots, Red	9 to 11	do	do
Bronze Ingots	10 to 14	do	do
Aluminum Casting Alloys	13 to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	10 to 14	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10½ to 12½	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13 to 17	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	12 to 16	do	do
Phosphor Tin, no guarantee	52½ to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$34.50-36.00	None	None
Iridium Platinum, 10%	$36.00-37.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	7¼ to 7⅜	Free	4c. per pound on copper content.
Light copper	6 to 6¼	Free	
Heavy yellow brass	4⅛ to 4¼	Free	
Light brass	3¼ to 3½	Free	
No. 1 composition	5½ to 5¾	Free	
Composition turnings	5 to 5¼	Free	
Heavy soft lead	3⅝ to 3¾	2½c. lb.	None.
Old zinc	2¾ to 3	1½c. lb.	
New zinc clips	3¼ to 3½	1½c. lb.	
Aluminum clips (new, soft)	14 to 15	4c. lb.	
Scrap aluminum, cast, mixed	7½ to 8	4c. lb.	
Aluminum borings—turnings	5 to 5½	4c. lb.	
No. 1 pewter	27 to 29	Free	
Electrotype or stereotype	3½ to 3¾	2⅛c. lb.*	
Nickel anodes	25 to 27	10%	
Nickel clips and turnings	20 to 22	10%	
Monel scrap	11½ to 13½	10% a. v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, small quantity, packing, etc., as shown in manufacturers' price lists, effective July 7, 1933.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16.625	2½c. lb.
Bare wire, soft, less than carloads	12¼	25% a.v.
Seamless tubing	16.125	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Grade "A" Sheet Metal		Wire and Rod	
10% Quality	22⅞c.	10% Quality	25¾c.
15% Quality	25 c.	15% Quality	30⅛c.
18% Quality	26¼c.	18% Quality	33⅜c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.30
Aluminum coils, 24 ga., base price	30.00

ROLLED NICKEL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

(Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (August 1) 38.50c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

BRASS AND BRONZE MATERIAL

Net base prices per pound, mill shipments.

	High Brass	Low Brass	Bronze	Duty	U. S. Import Tax
Sheet	14¼c.	15.50c.	15⅞c.	4c. lb.	4c. lb on copper content No tax.
Wire	14¼c.	15.50c.	15⅞c.	25%	
Rod	11¾c.	15.25c.	15⅝c.	4c. lb.	
Angles, channels	22¼c.		23⅞c.	12c. lb.	
Seamless tubing	15⅞c.		17⅝c.	8c. lb.	
Open seam tubing	22¼c.		23⅞c.	20% a.v	

TOBIN BRONZE AND MUNTZ METAL

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	15½c.
Muntz or Yellow Rectangular and other sheathing	16⅛c.
Muntz or Yellow Metal Rod	12¾c.

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, full casks (jobbers' price)	9.75	2c. lb.
Zinc sheet, open casks (jobbers' price)	10.50 to 10.75	2c. lb.
Full Lead Sheet (base price)	8.00	2¼c. lb.
Cut Lead Sheet (base price)	8.25	2⅜c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Lighter gauges command "extras" over the above prices.

Supply Prices, July 31, 1933

ANODES

(Quantity Prices)

Copper: Cast	15¼c. per lb.	**Nickel:** 90-92%	43c. per lb.
Rolled, sheets, trimmed	14¼c. per lb.	95-97%	44c. per lb.
Rolled, oval	13¼c. per lb.	99% + cast, 46c.; rolled, depolarized, 47c.	
Brass: Cast	14¼c. per lb.	**Silver:** Rolled silver anodes .999 fine were quoted Aug. 1, from 38.50c., per Troy ounce upward, depending upon quantity.	
Zinc: Cast	9c. per lb.		

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

Any Quantity

4 to 6	Under ½, $5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	" 5.55	" 5.40	" 5.35
1 to 1½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 31:

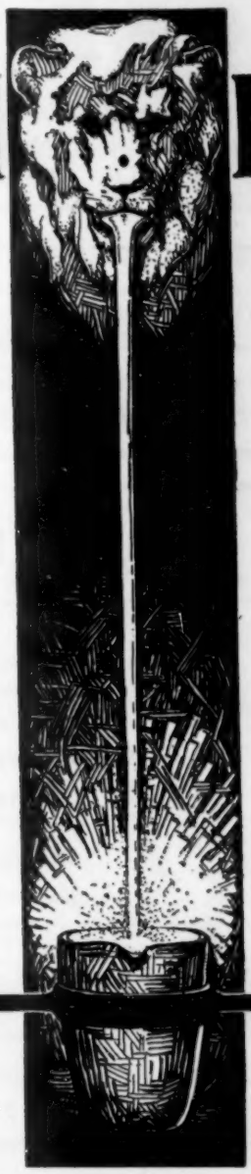
11" 20 ply 64/68 Unbleached	$31.12
14" 20 ply 64/68 Unbleached	45.64
11" 20 ply 80/92 Unbleached	35.65
14" 20 ply 80/92 Unbleached	52.36
11" 20 ply 84/92 Unbleached	42.78
14" 20 ply 84/92 Unbleached	62.93
Sewed Pieced Buffs, per lb., bleached	40c. to 70c.

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone	lb.	.08-09
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 75 to 400 lb. drums	lb.	.11½-.17½
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.02
Hydrochloric, C. P., 20 deg., carboys	lb.	.06
Hydrofluoric, 30%, bbls.	lb.	.08-.12
Nitric, 36 deg., carboys	lb.	.06-.06½
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl	lb.	.095-.11
Denatured drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02¾-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals	lb.	.28-.37
Arsenic, white, kegs	lb.	.04½-.05
Asphaltum	lb.	.35
Benzol, pure	gal.	.58
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk)	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.06-.12
Chrome Green, bbls.	lb.	.18
Chromic Sulphate	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.22
Carbonate, bbls.	lb.	.16¾-.20
Cyanide (100 lb. kgs.)	lb.	.39
Sulphate, bbls.	lb.	3.75-4.45
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus	lb.	.15
Dextrin	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	$30.00
Fluorspar, bags	lb.	.03½
Gold Chloride	oz.	$12-$14
Gum—Sandarac	lb.	.26
Shellac	lb.	.32-.34
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lacquer Solvents	gal.	.85
Lead—Acetate (Sugar of Lead)	lb.	10-13½
Yellow Oxide (Litharge)	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, 100% synth., drums	gal.	.41½
Nickel—Carbonate, dry, bbls.	lb.	.35
Chloride, bbls.	lb.	.17-.21
Salts, single, 300 lb. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.08-.093
Potassium—Bichromate, casks (crystals)	lb.	.08
Carbonate, 96-98%	lb.	.07½
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.25
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.05½
Silver—Chloride, dry, 100 oz. lots / Cyanide (fluctuating) / Nitrate 100 ounce lots		Prices subject to rapid fluctuations of silver market.
Soda Ash, 58%, bbls.	lb.	.023
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	.03-.04
Nitrate, tech., bbls.	lb.	.03¼-.07
Phosphate, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, fluctuating	lb.	.35
Sulphocyanide	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, fluctuating, 100 lb. kegs	lb.	.36½
Tripoli, powdered	lb.	.03
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11
Chloride, drums, bbls.	lb.	.07½-.10
Cyanide (100 lb. kegs)	lb.	.38
Sulphate, bbls.	lb.	.03½

MONARCH FURNACES



STATIONARY CRUCIBLE FURNACE—
Low Air, Combustion Chamber
oil—gas

REVOLVING FURNACE—MOTOR DRIVEN
For Melting Brass, Copper, Aluminum, Gold, Silver and Other Metals and Alloys
oil — gas

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